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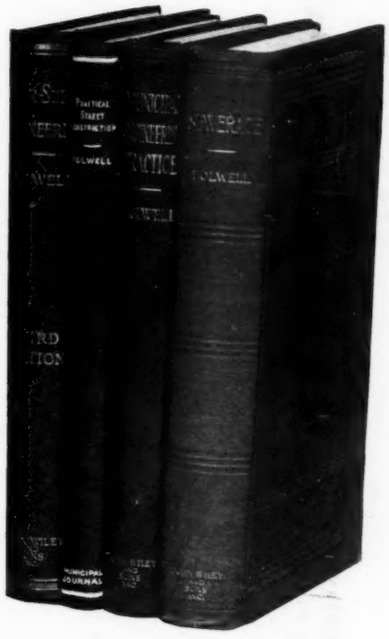

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Municipal Journal

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THE CHOUTEAU AVENUE VIADUCT

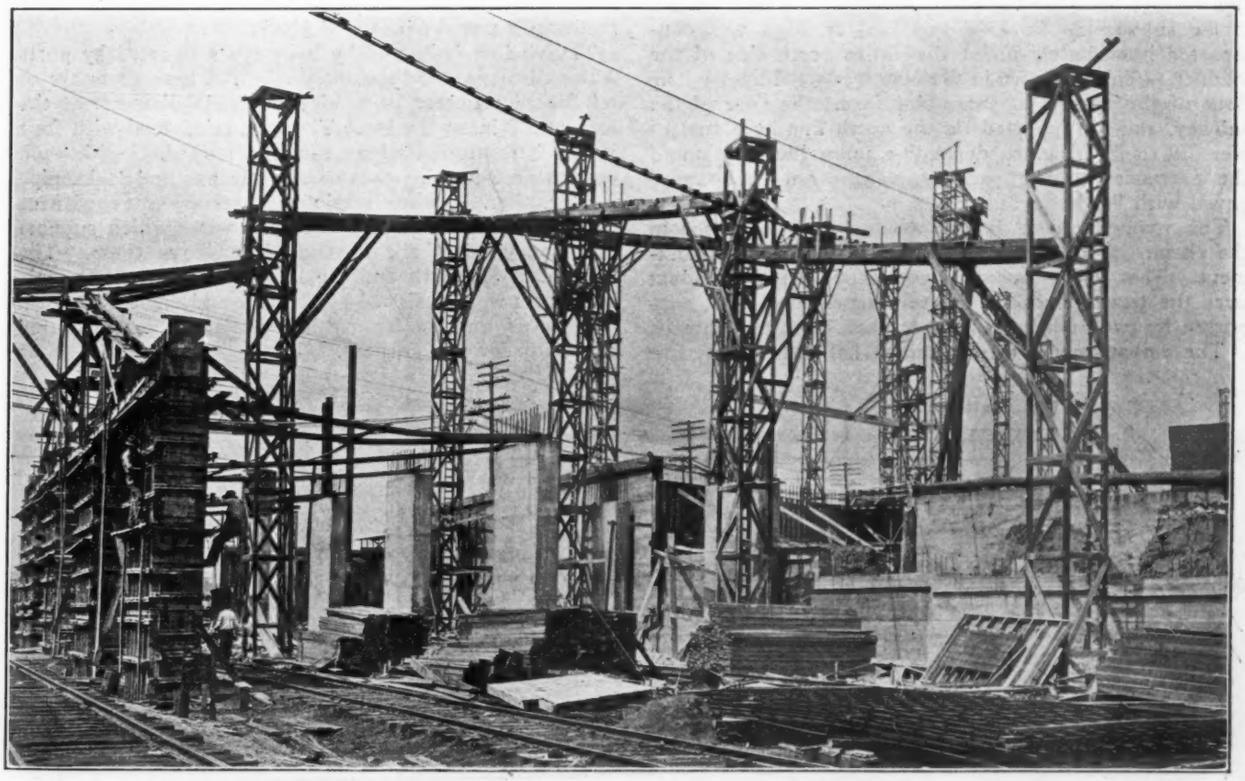
Inclined Approaches Along Viaduct from Bottom of Valley Spanned—Vehicle Subway Under One Side of Floor—Provision for Expansion—Delivering Concrete from a Central Plant.

By W. E. HARDENBURG.

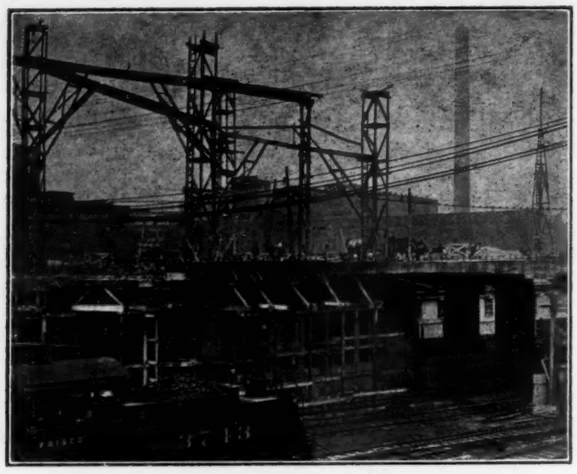
A viaduct was completed in St. Louis in September of this year which exhibits a number of novel and interesting features. This viaduct carries Chouteau Avenue over the tracks of the St. Louis & San Francisco and the Missouri Pacific railroads, eliminating a dangerous grade crossing over the latter and replacing a smaller bridge over the former. The construction of the viaduct has permitted the St. Louis & San Francisco railroad to increase its number of tracks from four to eight.

The viaduct extends from a point just east of Vandeventer Avenue eastward to the west line of Tiffany Street, a total distance of about 1,500 ft., of which about 650 ft. is in embankment. The west half has a grade of 3.2 per cent and the east half a grade of 0.9 per cent, which grades give a clearance over the railroad tracks of 22 ft. The viaduct is 80 ft. wide, of which 56 ft. is roadway containing two street railway tracks, with a 12-ft. sidewalk on each side. Near the west end, Pacific Avenue intersects Chouteau Avenue at right angles and from here a roadway and sidewalk are carried along the south side of the viaduct in each direction, rising on a flat grade that follows practically the surface of the ground, and are connected with the viaduct proper near the east and west ends thereof, as shown in the plan on the next page.

There are two embankments, one the approach at the west end, the other a section about 200 ft. long just west of the St. Louis & San Francisco tracks. The open sections consist of a reinforced concrete slab floor system supported by a series of reinforced concrete piers. Each



BUILDING VIADUCT PIERS AT ST. LOUIS & SAN FRANCISCO R. R. TRACKS.
At the left, completing forms for a pier. Wooden towers are for supporting concrete-distributing chutes.



SIDE VIEW OF VIADUCT, SHOWING CONSTRUCTION OF PIERS.

pier consists of a bent of three columns, all the bents being at right angles to the line of the viaduct except those at the railroad tracks, which are placed at a skew, the angle of which is determined by that of the tracks, being 58° 24′ in one case and 61° 50′ in the other. The bents in the normal sections are spaced 27½ ft. center to center, and in the skew sections about 35 ft. The three columns in each pier are spaced 27½ ft. between centers. In all there are 31 piers, or 93 columns, and 4 abutments. An expansion joint is provided at each abutment, and three additional ones were located as shown on the plan.

One side of the embankment section between the two railroad rights-of-way (which was substituted for pier construction because of the elevation of the ground at that point) had been used as an approach to the Independent Packing Plant, which is located just north of the viaduct, and for the accommodation of this plant a traffic subway 22 ft. wide and 12½ ft. high was constructed immediately under the entire north side of the viaduct. (This is shown in the plan by dotted lines.) The floor of the viaduct at this point forms the roof of the subway, and is supported on the north line by a row of piers 19 to 29 ft. apart, depending upon the location of the entrances to the packing plant. This subway is paved with brick.

The roadway from Pacific avenue westward to join the viaduct connects with this on the approach embankment. That rising eastward connects with the viaduct over the tracks, and a side deck is provided here, supported by two additional piers in each of three bents.

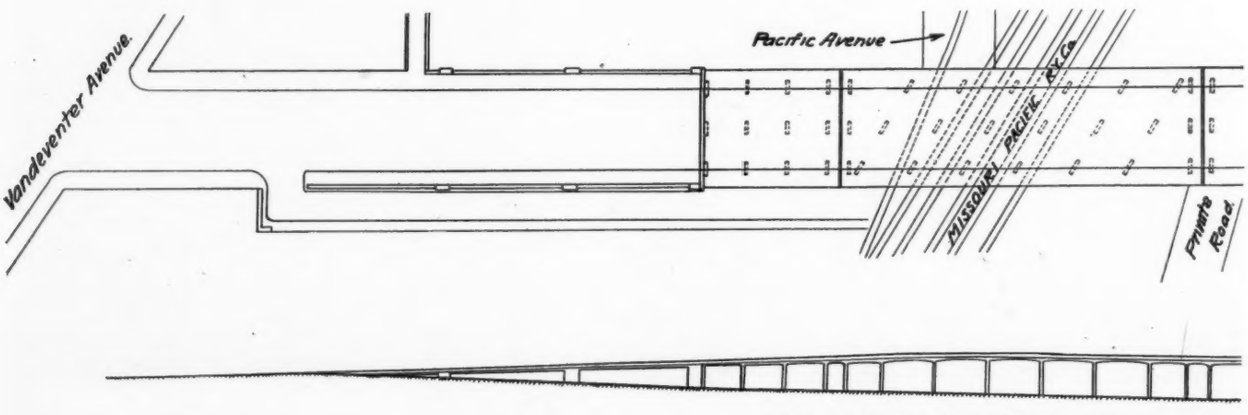
The embankments are contained between counterfort retaining walls 2 ft. 3 in. thick and reinforced with ¾-in. round bars laid horizontally. The abutments are similar in construction. Each pier column is 2 ft. thick and 9 ft. measured transversely of the bridge, except at the west skew section, where they are 10 ft., and the east skew section, where they are 9½ ft. Each pier is reinforced with 22 round vertical bars, 1-in. to ⅞-in. thick, depending upon the height of the pier. Where the skew bents and normal bents adjoin, the two come together at one end so as to give the appearance there of one normal pier. The viaduct deck does not rest directly upon the abutments, but upon a set of pier columns which are placed within a minimum of 2 in. from the abutment, the interval serving as an expansion joint. The foundations of the piers extend to bed rock, which is found at depths varying from 8 ft. to 56 ft. At Pacific avenue and around the approach to the subway the piers are protected by traffic guards edged with iron 2½ ft. high and projecting outwardly 14 in. all around.

The deck of the viaduct is of continuous flat slab construction, the slabs being 20 in. thick in the middle of each span and 24 in. over the piers in the normal construction, and 22 in. and 27 in. respectively in the skew construction. That portion over the subway consists of a 10-in. slab supported between reinforced beams 2 ft. wide and 32 in. deep, spaced 10 ft. between centers.

Underneath each sidewalk is left a channel 6 ft. by 8 in. in which to place pipes and wires of the public utilities. Descending from each sidewalk at the Missouri Pacific tracks is a stairway, giving quicker approach to the viaduct from Pacific avenue than by following the inclined roadways. These stairways are of reinforced concrete 5 ft. wide, with 2-in. iron pipe hand-rails, and treads ready cast from designs worked out by a local contractor.

The guards along the outer sides of the viaduct consist of brick walls 12 in. thick, capped with a stone 5 in. thick, the whole being 42 in. high. At intervals, over piers when possible, post effect is given to the wall by slight projections in the brick work 30 in. long. The roadway is paved with wood block.

The viaduct is lighted by 34 lamps supported by posts which also support the trolley wires. These posts are of reinforced concrete 21 ft. high, 12 in. in diameter at the base and 5 in. at the top. They are reinforced with four 1⅛-in. bars around which wire is wrapped. Inside each post are a 2-in. pipe that carries the gas and ½-in. pipe for the pilot. Bronze lighting fixtures are attached near the tops of the posts and the span wires which support the trolley wires are fastened just above these. The posts cost $82 each and the lighting fixtures $180 each. The posts were designed by the city and made by a local contractor, and the bronze brackets were manufactured especially for this purpose.



GENERAL PLAN OF VIADUCT, AND PROFILE

CONSTRUCTION METHODS.

The construction involved about 15,350 cu. yds. of concrete, the principal other items being the wood block pavement of the roadway, which costs $32,466, the lamp posts, brackets, sidewalks, etc. The total of all the contracts was $199,703.

Excavation for the pier foundations was in most places through a mixture of clay, loam and sand, although quicksand was encountered at one place, and here Lackawanna steel sheet piling was used, and a small pump for dewatering the excavation. Excavation down to a depth of 35 ft. was performed by 2 men digging and 2 men removing the dirt by a windlass. Where the depth exceeded 35 ft., a small hoisting engine was employed. Excavations were carried down at an average rate of 5 to 7 ft. a day. The contract price for excavation was 8½c. a cubic foot.

Three grades of concrete were used in the work, that for the deck being mixed 1:2:4, that for the walls, abutments and piers 1:2½:5, and that for the deep foundations 1:3:6. All the concrete was mixed at a central plant about 200 ft. west of the St. Louis & San Francisco tracks and distributed by the tower and chute method. The concrete plant consisted of two ¾-yd. mixers and its capacity was estimated at 20 cu. yds. an hour, although it frequently ran up to 25 cubic yards. The specifications required that the concrete be mixed for 3 minutes. The materials were brought to the plant in cars. Both mixers discharged the concrete into a single pit at the foot of a main hoisting tower, where it was received in a bucket in which it was carried up the tower and discharged into chutes that led to all parts of the viaduct within a radius of 450 ft. As the western end was more than this distance from the mixing plant, the concrete used near and west of the Missouri Pacific Railway tracks was lifted by a second hoist and discharged into a second set of chutes covering the remaining 500 or 600 ft. All fixed chutes were given a slope of 8½ on 40. They were about 9 ins. wide and 9 ins. deep and were supported at 40-ft. intervals by towers 4 ft. square, built up of 4 by 4 timbers. The two hoisting towers were 7 ft. square and built up of 4 by 6 timbers. The hoisting equipment at each of the two towers consisted of two electric motors, one a direct current and the other an alternating current. As far as possible, walls and slabs were built in monoliths containing all of the concrete mixed during the 8 to 11 hours of continuous work, or about 200 cubic yards.

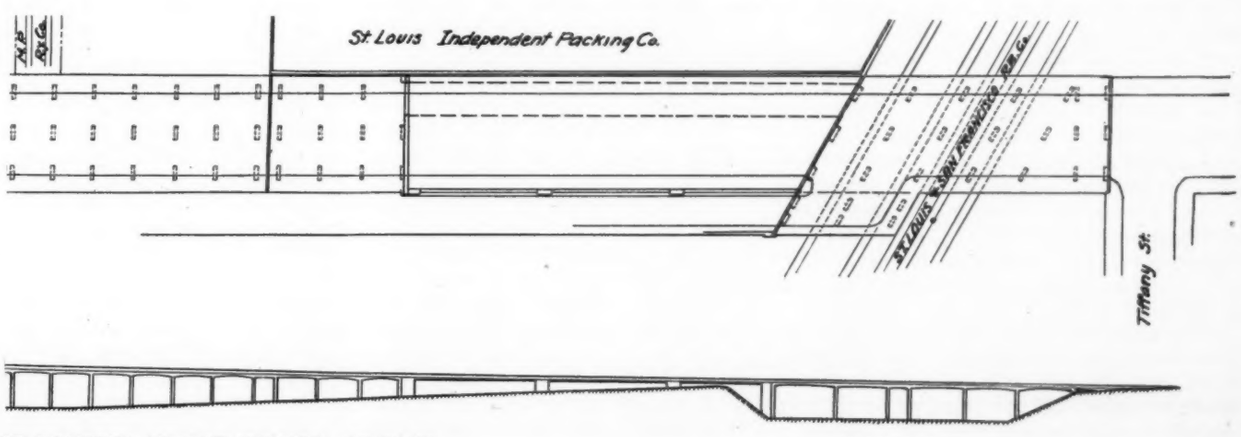
Toward the total cost of the viaduct proper, nearly $200,000, the Missouri Pacific Railroad contributed $155,000, the St. Louis & San Francisco $35,000, and the local traction company $10,000. The work was, however, carried on under the direction of the city. In addition to this, $15,818 was spent in paving a part of Pacific avenue and the 22-ft. roadway connecting it with the viaduct, which sum was prorated between the city and the adjoining property owners. The contractor for the concrete and the guard walls was the F. C. Mueller Co.; for paving the viaduct roadway, the Heman Construction Co.; for the other paving, the Skrainka Construction Co.; for the concrete lamp posts, the Unit Construction Co.; for the bronze light brackets, the American Foundry & Mfg. Co., and for the walks, J. Herckert.

The work was in charge of L. R. Bowen, chief of the Bridge Division, Department of the President, Board of Public Service of the city of St. Louis. C. W. Martin was in charge of the design, and W. R. Crecilius was in charge of construction. The author is indebted to the last for the information given above.

REINFORCEMENT OF FLOOR SLAB.
Concrete-distributing chutes resting on portable supports in background.

ELECTRIC LIGHTING IN SIOUX FALLS.

During the six months from April to September, 1917, inclusive, Sioux Falls, S. D., used in its street lighting 161 ornamental luminous-arc lamps of 6.6 amperes at a total cost of $3,187.47, or $19.80 per lamp. During this time there were used 1,212 electrodes or about 7½ electrodes per lamp during the six months. There were also replaced 47 globes, indicating an average life of something more than 20 months per globe. The labor varied from $60 to $65 a month, averaging $62.85 a month, or about 39 cents per month for each lamp. Maintenance



OF VIADUCT AND OF GROUND SURFACE.

cost a total of $2,557.34. This does not include the cost of current, which was generated by the city plant. Of this, 71,788 kwh. were consumed during the six months.

The plant used for generating the current contains three Diesel oil engines rated at a total of 840 hp., three Kinney boilers rated at 700 hp., and an Ideal engine rated at 125 hp. There were four dynamos having a total capacity of 641 kw. Oil was used for fuel costing 5c a gallon, and 100 gallons generated 1,000 kwh., making the cost of fuel 0.5c per kwh.

SEWAGE TESTING STATIONS

Suggestions for the Construction and Operation of Such Stations—Building Tanks and Other Apparatus—Selecting Machinery—Cost of Stations.

Under the title "Experimental Engineering, Particularly the Construction of Testing Stations on Water and Sewage Problems," Langdon Pearse, division engineer in charge of sewage disposal investigations for the Sanitary District of Chicago, some weeks ago delivered a lecture as one of the J. E. Alfred Lectures on Engineering Practice, which gave a number of suggestions, both general and in detail, which should be of great value to engineers who are considering or engaged in the construction and operation of experimental sewage treatment works. While the title and the first few paragraphs suggest that experimental engineering generally is to be treated of, the author devotes practically all of his attention to sewage treatment work, the reason given being that at the present time most of the experimental work being carried on is of this nature. Some of the more interesting and valuable suggestions made by the author are quoted or abstracted below.

"A testing station is a collection of apparatus designed to demonstrate or ascertain principles under conditions where precedent does not clearly apply. . . . The final accomplishment is to indicate how a given problem may be solved at lowest cost to meet the necessary conditions." An engineer facing the expenditure of large sums of money wants to plan along safe lines and when experience indicates that previous work or conditions are not a safe guide, actual tests that duplicate the real conditions are made and from them are deduced engineering constants and the critical factors in design or process.

The testing plant should comprise a full size working unit if possible, or at least a considerable fraction of such a unit. If this is not possible, critical features should be studied. For designing and constructing the plant the following suggestions are important:

1. Use standard materials to expedite construction.
2. Keep the cost low and provide that changes may be made as inexpensively as possible.
3. Design so that removal and dismantling of the plant may be easy.
4. Provide flexibility, so that changes in arrangement and control may be made readily.
5. Provide a moderate number of sampling points, thus making control easy, but not too automatic.

As to materials, the cheapest material which will last during the probable life of the testing station is the best. Wood and sheet iron may be used where concrete or other more permanent material would be essential for permanent works.

The author takes up the several units of a sewage experimental plant, giving suggestions concerning each. For tanks he suggests using wood for large ones and galvanized sheet iron for small ones. Wooden tank floors should be supported at frequent intervals, and if buried in the ground, adequate provision must be made to resist earth pressure. On soft ground, footings should be of heavy plank, well-crossed, to make the settlement uniform. It is desirable to have a regular tank manufacturer construct the tanks, as he is equipped to handle this work expeditiously and can probably secure water-tightness at minimum cost. Circular tanks are usually made of Oregon fir, or of redwood on the Pacific coast. Rectangular tanks may be made of Oregon fir or even yellow pine. The largest rectangular tanks the author has seen were a set of three, each 40 ft. long by 7½ ft. wide by 9 to 10 ft. deep, built of 3-in. yellow pine and bolted through every 20 ins. in the sides and bottom. The sides were held in place by buck-staves tied together by bolts through the tanks. Rectangular tanks have sometimes had galvanized iron lining or a lining of tarred roofing paper between two layers of planks. Inside of these tanks false bottoms can be made of any form required by using tile faced with concrete. These should be provided with vents for air and water and protected from freezing by banking earth outside or otherwise. For small iron tanks and orifice boxes, iron of No. 20 to 24 gauge is generally used, with a stiffening of iron rods or light angles if required.

In selecting machinery such as blowers, pumps, motors, etc., the best stock designs should be chosen. Sturdy construction is necessary to stand up to a daily service of 24 hours a day, week in and week out. Simplicity of machinery also is desirable, for skilled mechanics are not always at hand in the middle of the night, and the men in charge must keep the plant operating at all times. Provision for lubrication must be simple and ample. In most stations pumping or other machinery has been operated by electricity, although at Akron a gasoline engine was used and at Gloversville a small water wheel. Ordinarily, alternating current motors give much less difficulty in untrained hands under continuous duty than direct current, although the latter will serve, if necessary.

The piping layout should be simple and direct. The common failing in first attempts at pipe layouts is the lack of unions and cleanouts or plugged ends. The pipe should be put together with graphite and oil on the threads to facilitate taking down. Wrought iron or steel with threaded joints is generally used for pipe under 6 ins. in diameter, while cast iron pipe with leaded joints or vitrified pipe may be used for larger sizes. In designing piping for channels where sewage or other liquids carrying material in suspension is to flow, velocities should be kept at or above 2 ft. per second in order to prevent deposit.

Lighting should be liberal at all important points where observations are required, but too many lights are to be avoided, as attendants are prone to forget to turn them off. Incandescent lamps are generally most convenient for lighting.

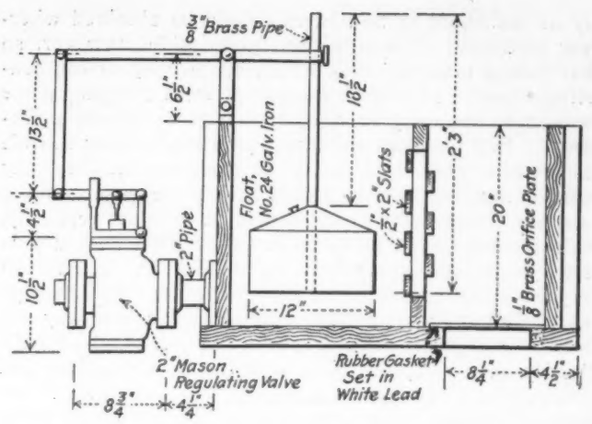
If the plant is built in a northern climate, exposed pipes or valves where water may stand must be protected from frost. Manure boxes or banking with earth may be employed. Some testing stations (as in Philadelphia) have been wholly enclosed. All measuring or controlling devices should be housed.

For measuring flow of water or sewage, standard orifices are ordinarily best for small flows, while for larger flows a V-notch weir may be desirable, and for still larger flows the usual sharp-crested rectangular weir with or without end contractions. A water meter may be used for measuring clear water, and in some cases a Venturi meter or Pitot tube may be used. Where a constant flow is desired, this is usually obtained by maintaining a constant head over an orifice or weir. This

may be effected by providing an overflow in the orifice box, or by controlling the valve on the intake pipe by a float in the orifice box or weir box. More accurate than the ordinary ball float is the home-made design illustrated herewith. The float can be counterbalanced to make the operation as delicate as desired. A good balanced valve should be used. Such orifice boxes in the control of experimental plants will maintain constant flow conditions for days, and have even been used on settled sewage. Orifices in copper or brass are found to be enlarged by corroding action. Glass orifice plates or glass tubes with an orifice drilled in the side may be used. Wherever possible, too small orifices should be avoided.

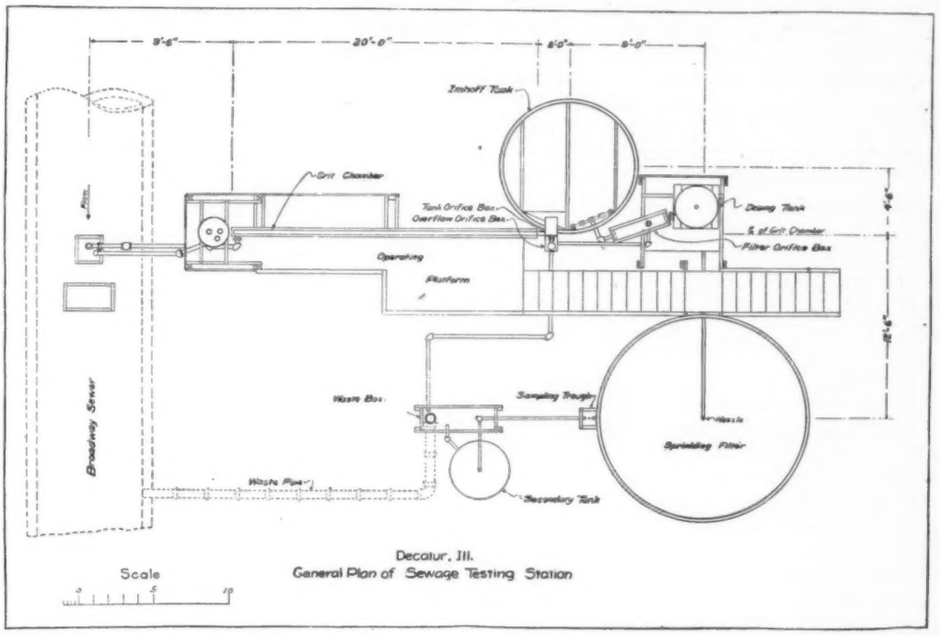
The flow of air may be measured by air meters of various types and by orifices. On small flows and low pressures, a meter of the gas type is convenient. For large flows, the Venturi or General Electric meter are of service. Pitot tubes also may be used.

Where a test is to be made upon sewage, a gravity sup-

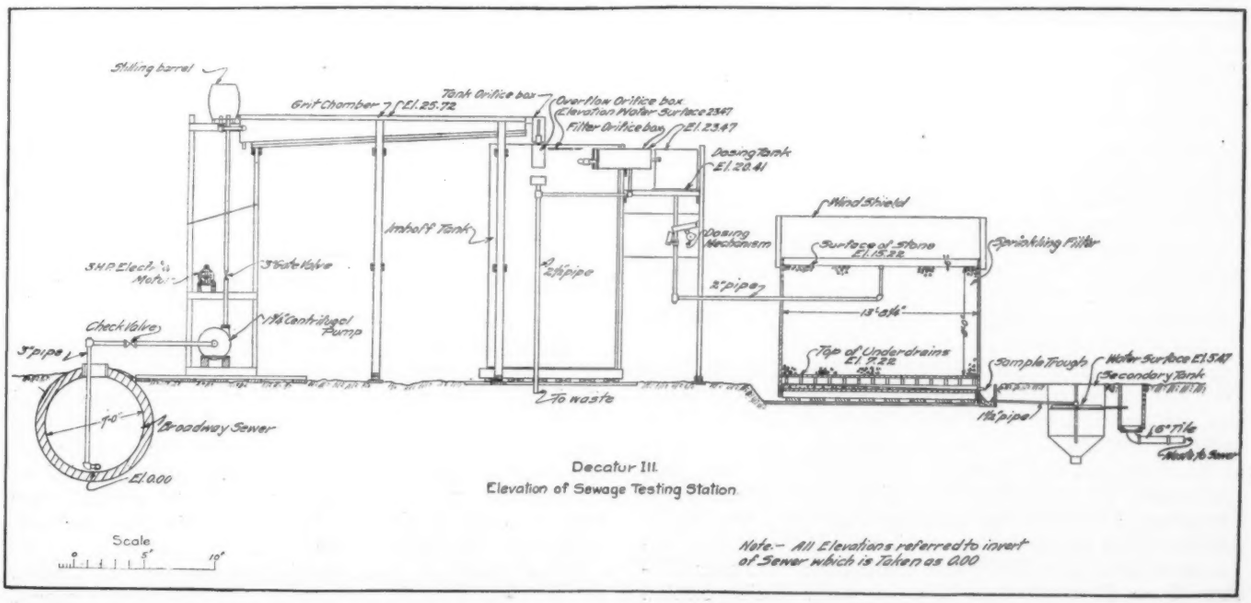


SPRINKLING FILTER ORIFICE BOXES, CHICAGO TESTING STATION.

This plant cost $1,142 erected complete, not including laboratory or its equipment. The material cost $758, labor $384. It comprised a motor-driven centrifugal pump, grit chamber, Imhoff tank, circular sprinkling filter, secondary tank, dosing device, and electric wiring. Operation for 4 months, exclusive of power and light, cost $1,560—unusually low. Treated about 75,000 gals. a day.



Decatur, Ill.
General Plan of Sewage Testing Station



Decatur Ill.
Elevation of Sewage Testing Station

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GENERAL PLAN AND ELEVATION OF DECATUR SEWAGE TESTING STATION.

ply of the liquid to be treated should be obtained wherever possible. This is seldom practicable, however, so that pumps must be used, which are usually of the centrifugal type. To protect the pumps from clogging, some method of removing the larger suspended matters is necessary. In a few stations slotted pipe strainers on flexible elbows have been used, but if the slots are fine they may remove material which should reach the plant. As a rule, bar screens with round or square bars, set vertically, with openings of ⅜-in. to ⅝-in. in the clear should protect a centrifugal pump from 1½-in. size up. The screen may be made as a box on the end of the section pipe (as at Chicago and Decatur), or set in a water way (as at the Chicago Stockyards and at Worcester), or built directly in a part of the sewer (as at Columbus and Gloversville). In the last named city the screen was made of wooden bars with 1⅛-in. clear openings, while in the other cities the clear opening varied from ⅜-in. to ⅝-in.

The author describes designs for fine screens, grit chambers, tanks and sprinkling filters, giving certain details as to slopes of bottoms, shape of filter, underdrains, etc.

Concerning the operation of these plants, he remarks that the design may be such that the control will be practically automatic, but experience shows that it is usually better to have enough work for the men in charge to do to keep them awake. On the other hand, automatic recording devices at vital points are useful as a record of and check on continuous operation.

Regular points for sampling should be designated. As a rule, composites are more instructive than individual samples. Frequent sampling is important; in general, once an hour may suffice, but in some cases samples should be taken every five minutes.

As a general rule, the best organization is to have one man in charge of both laboratory and testing station proper, with one experienced laboratory man in sympathy with experimental work at the head of the laboratory force and an active young engineer in charge of the testing station. Actual collection of samples is usually entrusted to non-technical men, but where possible it is better to have a higher grade of men, such as young technical graduates, although even these are not altogether infallible, particularly when pleasure and sleep clash with the work.

In order to permit comparison of results with those obtained at other plants, standard methods should ordinarily be followed, usually those of the American Public Health Association. Frequently, however, special tests have to be devised or short cuts worked out.

The time required for obtaining results depends on the conditions and the character of treatment required. Most municipal testing stations have operated at least 12 months to secure results throughout the four seasons of the year. From three to six months of warm weather are certainly required to establish biological processes, as in sprinkling filters or in studying Imhoff tank sludge digestion, before real results can begin to be obtained. Where new processes are being worked out, a station may be operated for two or three years.

The author gives a list of a number of the investigations that have been made of water and sewage purification and the costs of each. These costs vary from $195,000 at Lawrence, Mass. (24 years' operation), down to $1,500 at Reading, Pa., and $2,000 at West Superior, Wis., and Richmond, Va. The first cost of the testing station at Columbus, O., including buildings and land, was about $25,000. The small testing station at Decatur cost $1,142 complete. The Milwaukee station has cost over $30,000. Over $1,500,000 has been spent on testing station work in the United States since 1888.

EXTENT OF THE RURAL ROADS.

Anything like a complete and accurate statement concerning the mileage of rural roads in the United States is impossible without an actual survey of all of these roads by some authority, since there is now no accurate record existing of a very considerable percentage of them. Efforts have been made by the United States Office of Public Roads and Rural Engineering to obtain as accurate estimates of this mileage as is possible, and that office has just issued the figures obtained by it. These figures, we understand, were obtained by applying to the county boards and asking them, when they did not already have the information, to obtain it from the various town officials.

The figures so obtained give the mileage at the close of the year 1916 as 2,455,761; this being the miles of all the rural roads in the country, of which 287,047 miles were surfaced in some way. That is, only 11½ per cent. of the roads were anything other than dirt.

The figures are classified by states, and show that of all the states, Massachusetts has the greatest percentage of its roads surfaced—476 per cent. Then follow, in order, Indiana with 42.5 per cent., New Jersey with 40.5 per cent, Ohio with 36.5 per cent. Rhode Island with 34.5 per cent., Kentucky with 23.2 per cent., New York with 22.7 per cent., Connecticut with 22 per cent., and California with 20.2 per cent. Indiana and Kentucky hold their prominent positions because of extensive use of gravel, and it is somewhat misleading to class these gravel roads with the expensive types used in Connecticut, for instance. The smallest percentages of surfacing have been done in Oklahoma, with 0.7 per cent., South Dakota with 0.8 per cent., Iowa with 1 per cent., Kansas with 1.3 per cent., North Dakota with 1.6 per cent., and Nebraska with 1.7 per cent. Here again the figures are misleading, for the excellent maintenance of many of the dirt roads of Iowa makes the riding and hauling over them very easy except during a short period in the spring, and some of these may have as much spent upon them for maintenance as some of the gravel roads in other states that are classified as "surfaced."

During 1916, $272,634,424 was spent on the roads of the country, plus statute and convict labor worth about $15,000,000, and about $15,000,000 paid as interest on road bonds, or a total of over $300,000,000. The cash expenditure in 1915 was $266,976,399, and that in 1914 was $240,263,784. While the expenditures in 1916 exceeded those in 1915 by more than $5,000,000, those of 1915 had exceeded the 1914 expenditures by $26,700,000. This slowing down of the road program in 1916 was attributed largely to labor and material conditions. In seventeen states the cash expenditures were less in 1916 than in 1915, these states including most of those in which the expensive types of construction requiring imported material are most common.

HAULING ROAD GRAVEL BY TEAMS AND TRACTORS.

Very careful records were kept recently of the cost of handling gravel for some main roads in Minnesota, which show the relative value of horse and mechanical traction under similar conditions. About 22 miles of roads had the gravel distributed over them by teams, and about 3.6 miles were covered with gravel hauled by a caterpillar traction outfit. Itemized cost records were kept so carefully that the results of these two methods of hauling can be compared.

Using teams, it was found that the cost of loading and hauling a cubic yard up to one-half a mile ranged from 57 to 94 cents per mile. Where the hauling was one-

half to one mile the cost per mile ranged from 30 to 48 cents. Where it was from 1 to 1½ miles, the cost was 23 to 35 cents, and where it was between 1½ and 2 miles the cost per mile was 22 to 28 cents. The detailed figures show that the cost depended largely upon the efficiency of the men engaged in loading the wagons. These loading costs varied from 7 to 25 cents per yard. The least figure was obtained by making the teamsters help in the shoveling and the highest figure was due to an excessive amount of frost and firewater.

The tractor outfit consisted of a gasoline-driven caterpillar tractor, seven 3½-yard spreading wagons, a 50-yard storage bin and a loading machine. The work was complicated by a very heavy grade at one place. The best that could be done here was to haul four cars across private land and then go back and haul the remaining three cars across this rough ground. A full train was then made up and hauled the remaining 2½ miles. The total average haul was about 3 miles. As the work progressed another gravel pit was opened where these grades did not exist and the hauling was done more easily. On the first part of the work the average cost was 15.4 cents per yard per mile and on the latter part it was 15.41 cents.

The engineer who reported these figures, Orrin J. Kipp, has stated that with a more powerful tractor and a loading outfit of greater capacity, a much lower operating cost could have been obtained with the tractor outfit. It is his opinion that with proper equipment, mechanical traction of this type is much cheaper than hauling by team. There are also other advantages which he has summed up as follows: By applying the gravel in two courses with a tractor, the gravel is rolled without additional cost and the road is ready for travel as soon as the tractor leaves it. Furthermore, by loading the gravel into a bin, thence into wagons and finally dumping it on the road, the material is better mixed than when it is shoveled directly from the bank into the wagons which dump it on the roads.

TRENCHING AT LOW COST.

G. R. Ensminger of Columbus, O., has recently done some water pipe trenching at what he thinks is exceptionally low cost. He used a Buckeye trenching machine with two men and dug 800 feet of ordinary water main trench a day. He figures that it would take 40 men to do the same work by hand in a day.

For caulking the pipe joints he used air pressure, stating that, while it costs the same to operate as hand caulking, it strikes a uniform blow and works faster and more regularly.

He back-filled the trench by putting traction engine wheels on his Ford and hitching it to a ditch-filler scraper. He computes a saving of 2 cents a lineal foot on the back-fill, flushing only being required for settling the trench and no tamping. The change of wheels either way was made in 30 minutes.

CLAY-GRAVEL FOR STREETS.

In his report for the year 1916 to the Committee on Streets of Charleston, S. C., J. H. Dingle, city engineer, stated that the clay-gravel roadways of that city demanded immediate attention, and expressed his opinion that it would be doubtful economy to relay them, since clay-gravel is not, in his opinion, suitable for city streets under modern conditions. He recommends the substitution of sheet asphalt, which he believes will be more economical than the wasting of money in efforts to repair the clay-gravel.

STREET CLEANING IN CINCINNATI.

The accounts of the Department of Street, Sewer and Catch Basin Cleaning of the city of Cincinnati, of which Fred Maag is superintendent, appear to be kept in excellent detail, so that it is possible to derive from them the itemized costs and also unit costs of almost any service. From Mr. Maag's report for 1916 we have selected a number of items of work done and unit costs which we think will be of interest.

Horses are used by the department in ash removal and removal of street sweepings, snow and ice, in drawing machine brooms and flushing machines and in sewer cleaning. The average amount of feed consumed by all horses, about 255 in number, throughout the year, was as follows:

Hay—14.7 lbs. per horse per day; oats—11.5 lbs.; nutritia—2.8 lbs.; and 2,200 lbs. of oil meal for the year. The total cost per horse-day was 34.9 cents. The number of horse-days devoted to each service is given for each month of the year, ash removal requiring about 60 per cent of this in winter and 40 per cent in summer. The average number of idle work-horses per day, excluding Sundays, varied from 58 to 17, and the average days per month, excluding Sundays, that each work-horse was idle, varied from 5.8 to 1.9. Excluding Sundays and holidays, the percentage of time that the horses were idle varied from about 8 per cent to about 30 per cent.

The various services performed are classified under the heads of "Flushing," "Machine-Brooming," "Street Sweeping," "White Wings," "Gutter Cleaning," "Ash Removal," "Snow Removal," "Broom Gang," "Gutter Cleaning after Flushing," "Cleaning Alleys," "Removing Weeds," "Cleaning Crossings," "Catch Basins, Inlets and Sewers," together with two or three miscellaneous services, such as maintaining dog pound. The unit employed in describing work done is a square of 16,000 square feet in the case of flushing, machine-brooming, broom gang work, alleys and weeds; squares of 400 lineal feet in the case of gutter cleaning; units of 1,000 square yards in the case of white wings, and cubic yards in the case of street sweepings, ash and snow removal.

Of flushing streets there was performed during the year 127,884 squares, on which were employed 10,493 horse-days. The labor cost per unit was 11.9c and the total cost was 24.1c with overhead. Machine-brooming was performed only during July to October inclusive and 1,059 squares were swept at a cost of 9.3c per square for labor and 22c total with overhead.

Of street sweeping there were removed 103,806 cu. yds., on which was employed 13,287 horse-days, the cost for labor being 27c per cubic yard and the total cost with overhead being 47.6c.

The white wings cleaned 120,842 unit squares of 1,000 sq. yds. each at a cost for labor of 30.5c and 35.2c total with overhead.

Of gutter cleaning there was performed 27,925 squares at a cost for labor of 13.6c and 15.3c total cost including overhead. Of gutter cleaning after flushing there was performed 79,491 squares at a cost for labor of 13.6c or 15.1c with overhead.

The broom gang cleaned 76,626 unit squares at a cost for labor of 24.3c or 29.5c with overhead.

The area served by the department is about 71 sq. miles, in which is about 618 miles of streets. White wings, scrapers and laborers receive $2.25 per day.

The several items are given by districts also (the city is divided into eight districts), including the labor cost per unit for each service in each district for each month of the year. As is generally the case, considerable variation is found in the unit costs in different sections of the city. Perhaps the most extreme variation in street

sweeping costs, for instance, was in January, when the unit costs for the eight districts were as follows: 17.8c, 35.5c, 34.1c, 42.8c, 30.5c, 22.3c, 23.1c, and 19.6c.

STREET LIGHTING IN RICHMOND

Municipal Plant Shows Great Saving to City During Five Years' Operation—Advantages and Efficient Life of Incandescent Lamps.

The city of Richmond, Va., has been operating a municipal electric lighting plant for five years. Some of the citizens considered such operation in the light of an experiment, and the city electrician, E. W. Trafford, in his report for the year 1916 states that it has proved to be a profitable experiment for the city and gives figures for substantiating this statement. The total cost of the service, including interest and depreciation, was $92,092 for the year, $80,660 being for the lighting service. (The difference, we believe, was for power supplied to the water department. No commercial lighting or power is furnished by the city.) Of this total, $47,235 was operating expenditure. The total output was 5,643,310 kwh. The average number of street lights in service during the year was 3,768, and the average candle power of the lights was 232.2. The department furnished 1,459,810 kwh. to the water department. The total amount of current sold to other departments at 3c per kwh. was 29,058.

The city has been substituting incandescent lamps for arc lamps, but at the end of 1916 still had in service 788 500-watt enclosed carbon lamps. Mr. Trafford states that the smaller power consumption of the incandescent lamps has enabled the department to consolidate circuits and release large quantities of copper wire for use in new constructions. The high price of copper wire made this feature of the incandescent lamp a very important one. He has kept careful record of the operation of every lamp connected to the city's lines and finds that the service rendered by the incandescent lamps is better than that of either the enclosed arc or flame arc, judging by the standard of failures during lighting hours. During the year each incandescent lamp was out an average of once in 310 nights, each enclosed arc lamp an average of once in 214 nights, and each flame arc an average of once in 73 nights. It appears from this that the flame arc lamp is that which requires the most attention, and the result of using them, and particularly the type of flame arc first purchased, is not considered satisfactory, especially since the war prevented obtaining foreign carbons. This was especially regrettable because these lamps are located in the most important streets of the city.

He also endeavored to learn the length of time during which incandescent lamps furnished satisfactory service. A number of lamps of which he had an accurate record were sent to the U. S. Bureau of Standards for photometric and efficiency tests, and the reports rendered showed that the average candle power had been maintained within recognized limits of good service regardless of the length of time during which the lamps burned, and he concludes that such lamps may be allowed to remain in service until they burn out without incurring any serious loss either in light or efficiency.

He makes a comparison between the cost of lighting the streets of the city when this service was purchased from a private company (which continued until some time in the year 1911) and the cost to the city at the present time under municipal ownership. "Objection has been made to comparison of this rate of the past with the rates of to-day, but, comparing the price for street lights which our sister city of Norfolk paid five years ago, I find it is paying the same price to-day and is asked to pay an identical price for the next ten years, and this is by the same public service corporation which supplies the citizens of Richmond." The arc lights used in 1910 were of 220 c.p. and cost $54.75 per annum. The average cost of the city plant during the last five years has been $37.26 per lamp per annum, while the lights are of larger candle power (232 c.p.). Comparing the cost of the street lighting service in Richmond with what it would cost to operate the same number of lights at the rates being paid in Norfolk, and including in the Richmond cost interest and depreciation on the value of the plant ($642,500), and also 1½ per cent to cover lost taxes, insurance and other minor expenses of a private plant, it is figured that the same service that costs Richmond $71,362 (including overhead, as stated) would cost on the Norfolk basis $120,344. There are other lights used in Richmond for which no rates can be obtained from the Norfolk contract, and if the same percentage of saving were applied to these also, the total saving effected by the Richmond plant would be $58,472, or about 9 per cent of the value of the plant.

MAKING CUTS IN PAVEMENTS.

In cutting out heavy pavements in Market street, San Francisco, for getting at their pipes and wires, the Pacific Gas & Electric Co. found it slow and expensive work cutting through the heavy bituminous top and concrete base with hand tools, and has adopted the use of hammer drills operated by compressed air. In blocking out the work, it cuts a trench around the area that is to be removed, using a chisel-shaped tool having a cutting edge about 3 inches long. In some cases where the concrete under the asphalt is very hard, for starting an opening a self-rotating hammer drill, weighing 38 pounds, with regular ⅞-inch steel, is used to drill holes making an angle of about 45 degrees with the vertical, into which wedges are driven to break out the concrete. Usually after a small hole has been opened in the concrete in this way, the rest can be broken out with square-pointed gads from 9 inches to 2 feet long, used in a 40-pound air jet hammer drill, with a single wide grip, push throttle handle, without automatic rotation of steel. Most of the gads used have a ¼-inch hole bored through them near the shank, which permits attaching to the gad one end of a chain, the other end of which is attached to the head of the hammer, as shown in the illustration.

CUTTING OUT PAVEMENT WITH AIR HAMMER DRILL.

For obtaining compressed air for these tools, the company uses a small electrically-driven compressor on wheels. Both of the hammers referred to were purchased from the Sullivan Machinery Co.

The 40-pound non-rotative hammer is used for driving sheet piling also. The soil is soft sand, and 2 by 4 and 2 by 6 planks are driven very satisfactorily by means of this hand hammer held on the top of the sheet pile.

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A. PRESCOTT FOLWELL, Editor
W. A. HARDENBERGH and SIMON BARR, Assistant Editors
CHARLES CARROLL BROWN, Western Editorial Representative

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DIAGNOSING BEFORE PRESCRIBING.

Cities of the United States have spent between one and one-half and two million dollars during the last 25 or 30 years in conducting investigations on sewage disposal in special experimental stations. This seems like a large sum to have spent in constructing and operating mere temporary plants, and undoubtedly many city officials and tax-payers have felt that, in asking them to make these expenditures, their engineers were making a confession of ignorance—that an engineer, if he professes to be an expert in sewage disposal, should be able to prepare a design for any city from his previous knowledge and not ask the city to pay for his acquiring knowledge necessary to prepare such plans.

In a lecture on the subject which is abstracted in this issue, Mr. Pearse has partially answered this question as follows: "In the planning of engineering projects, it is frequently necessary to meet new conditions under circumstances where previous experience indicates no certain solution. This is particularly true in the field of sanitary engineering, which has grown vigorously since 1888, largely due to the demand for better public health and municipal sanitation." The chief reason why such investigations are necessary before planning the larger and more expensive works for treating sewage is that sewage itself is such a variable material that its characteristics are seldom the same in any two cities. Another and less important difference is in the climatic and other local conditions which vary from city to city. The sewage treated in disposal plants is generally a mixture of domestic sewage and industrial sewage. There is perhaps not so much variation in the former except in its strength, but the nature of industrial sewage depends upon the relative amounts of waste water discharged by each of the various kinds of industries in the city and the nature of the processes carried on in each of these; and it is evident that there are hardly any two cities to be found in the country in which both the kinds of industries and the relative proportions of waste therefrom are identical. For instance, the sewage of Worcester, Mass. has as one of its determining characteristics an abundance of acid in the shape of waste pickling liquors, while certain sewers in Philadelphia carry enormous quantities of greasy matters contributed by wool washing.

In addition, it may be said that improvements and developments in methods of treating sewage have succeeded each other so rapidly during the past 15 or 20 years that none of the later of these, at least, has yet been so thoroughly studied that its operation under any and all conditions can be confidently predicted by anyone, even though he be practically familiar with all of the available information on the subject.

While it is probable that any experienced sewerage engineer can design a plant for any given city which will prove fairly satisfactory, he cannot feel certain without trial that the plant so designed will be the most satisfactory one possible. Where a large sum of money is to be spent, it is quite probable that by trying out two or three of the most promising methods in small plants, a saving may be made in first cost of the complete plant, or in cost of operating it, or in both, which will far outweigh the expenditure made upon such test.

THE PROBLEM OF RURAL ROADS.

There are, according to the United States Office of Public Roads, more than 2,000,000 miles of rural roads in the United States which have never been paved or surfaced in any way, but which consist only of the natural soil, which has been kept in more or less satisfactory condition by the use of scrapers and drags in some cases, but in many others has never even been graded or improved in any way. To put reasonably good paving upon all of this mileage at an average cost of say $10,000 a mile would cost more than twenty billion dollars. It is probable that the United States will spend all of that amount in the war upon which it has just entered—England has already spent more than twice as much—and it might be an open question whether, if we can raise such a sum for war purposes, we cannot raise a similar sum for road construction, which could be considered as an investment of the money from which financial returns might be expected. Possibly the time will come when such expenditure for good roads will be possible, but that time certainly has not yet arrived.

In fact, we question very much whether such expenditure would be wise at the present time. There are undoubtedly many thousands of miles among these two million over which not more than one or two teams a day pass, and it is more than questionable whether, in the majority of such cases, an expenditure of $10,000 a mile in paving would not be almost total waste. Especially when we consider that most of these can be kept in a very fair condition during ten months of the year by a little judicious use of the drag and other simple and inexpensive methods of maintenance.

The existence of such an enormous mileage of dirt roads, however, does seem to point to the necessity for some widespread education in the proper methods of maintaining such roads, and for a greater amount of attention by state road authorities to promoting such education rather than devoting all of their energies and finances to the more interesting task of constructing high-grade road surfaces.

INTAKE AND OUTFLOW VELOCITIES

Effect of Mouthpieces or Flaring Ends on Pipes and Conduits in Reducing Loss of Head—Application to Turbines, Pump Connections, etc.

Bulletin No. 96 of the Engineering Experiment Station of the University of Illinois contains a description of and conclusions from experiments on the effect of attaching mouth pieces to the intake and outflow ends of a short pipe, so far as these affect the head lost at entrance and exit and the velocity of flow through the pipe. The problem investigated might appear to be one of very little practical value, but in certain classes of work having to do with water (including sewage) the solutions of it are by no means unimportant. Concerning this, the investigator (Fred B. Seely, Associate in Theoretical and Applied Mechanics) cites a number of instances where it is of considerable importance to know how to reduce this lost head. For example, the passages through a large valve or through locomotive water columns, the draft tube to a turbine, the connection from a centrifugal pump to a main, sluice ways through dams, slat screens at head gates, culverts and short tunnels, suction and discharge pipes of dredges, and the guide vanes and runner of a turbine. The efficiency of a pump working under low head may be increased by an entrance mouthpiece on the suction pipe because it would allow the pump to receive the water in smoother condition of flow. It is well known that a turbine must receive the water from the guide vanes without shock if, in the subsequent flow through the runner, the energy of the water is to be absorbed efficiently by the turbine. The loss of head through a Venturi meter may be considerably increased if the meter is placed too short a distance downstream from a valve, elbow, or other obstruction or cause of disturbance in the pipe. It is worth mentioning in this connection that the recent advances in turbine design have been due largely to the attention given to the approach channels to the guide vanes and to the design of the draft tube.

The experiments described in this bulletin consisted in attaching conical mouthpieces to the entrance and discharge ends of a pipe 6 ins. in diameter and 22½ ins. long. No experiments were made with mouthpieces with curved elements rather than straight, although it would appear to us that the effect would have been increased by the use of such mouthpieces. The velocities through the pipe during these experiments were made to range from about 0.6 of a foot per second to 5 feet, or those which are most commonly found in flow in sewers, water mains and other forms of conduits.

Without going into any of the details of the experiments, the author's conclusions may be quoted as follows:

"The preceding discussion has shown that the losses accompanying the flow of water depend largely upon the state of its motion, which in turn is influenced by many factors, the effects of which in many cases can be but roughly estimated. While the results of these experiments tend to define the range of such effects for certain conditions of flow, additional experiments would be necessary to establish all the inferences which have been suggested. The following conclusions, however, seem justified:

"(a) As applying to conditions likely to be met in engineering practice, the value for the head lost at the entrance to an inward-projecting pipe (i. e., without entrance mouthpiece and not flush with the wall of the reservoir) is 0.62 of the velocity head in the pipe $(0.62\frac{v^2}{2g})$, instead of $0.93\frac{v^2}{2g}$, as usually assumed. To put it in another form, the coefficient of discharge for a submerged short pipe with an inward-projecting entrance is 0.785, instead of 0.72, as given in nearly all books on hydraulics. Further, the lost head at the entrance to a pipe having a flush or square entrance is 0.56 of the velocity head in the pipe $(0.56\frac{v^2}{2g})$, instead of $0.40\frac{v^2}{2g}$, as usually assumed. In other words, the coefficient of discharge for a submerged short pipe with a flush entrance is 0.80, instead of 0.82, as given by nearly all authorities.

"(b) The loss of head resulting from the flow of water through a submerged short pipe when a conical mouthpiece is attached to the entrance, may be as low as 0.165 of the velocity head in the pipe $(0.165\frac{v^2}{2g})$ if the mouthpiece has a total angle of convergence between 30 and 60 degrees and an area of ratio of end sections between 1 to 2 and 1 to 4 or somewhat greater. In other words, the coefficient of discharge for a submerged short pipe with an entrance mouthpiece as specified above is 0.915.

"(c) The loss of head which occurs when water flows through a submerged short pipe having an entrance mouthpiece varies but little with the angle of the mouthpiece if the total angle of convergence is between 20 and 90 degrees and if the area ratio is between 1 to 2 and 1 to 4 or somewhat more. The loss of head for any mouthpiece within this range would be approximately 0.20 of the velocity head in the pipe $(0.20\frac{v^2}{2g})$. There is, therefore, little advantage to be gained by making an entrance mouthpiece longer than that corresponding to an area ratio of 1 to 2. Thus, an entrance mouthpiece with a total angle of convergance of 90 degrees and the length of which is only 0.2 of the diameter of the pipe gives approximately $0.20\frac{v^2}{2g}$ for the loss of head.

"(d) The amount of velocity head recovered by a conical mouthpiece when attached to the discharge end of a submerged short pipe depends largely upon the angle of divergence of the mouthpiece. This is true for lengths greater than that corresponding to an area ratio of 1 to 2 and for total angles of divergence of 10 degrees or more. The amount of velocity head recovered decreases rather rapidly as the angle of divergence increases from a total angle of 10 to 40 degrees. At or near 40 degrees the amount of velocity head recovered falls rather abruptly to approximately zero.

"(e) A conical discharge mouthpiece having a total angle of divergence of 10° and an area ratio of 1 to 2, when attached to a submerged short pipe, will recover 0.435 of the velocity head in the pipe, which is 58 per cent of the theoretical amount possible of recovery.

"(f) The amount of velocity head recovered by a diverging or discharge mouthpiece when attached to a submerged short pipe is considerably more when a converging or entrance mouthpiece is also attached than it is when the entrance end of the short pipe is simply inward-projecting (no mouthpiece attached). This excess in the velocity head recovered diminishes rather rapidly as the angle of the discharge mouthpiece increases, and it becomes zero for a discharge mouthpiece having a total angle of divergence of approximately 40°. This increase in the velocity head recovered is probably due to the effect of smooth flow in the pipe as the water approaches the discharge mouthpiece. The smooth flow allows the mouthiece to recover more of the velocity head in the pipe than when a more turbulent flow exists; this increase amounts to as much as 33 per cent in the case of the discharge mouthpiece having a total angle of divergence of 10° and an area ratio of 1 to 2.

"While these conclusions are drawn from experiments on the flow of water through a particular short pipe having various entrance and discharge conditions, it is felt that the results of the experiments are applicable in a general way to a large variety of cases in engineering practice where the contraction and expansion of a stream of water occurs. A number of such cases are suggested in the introduction."

The WEEK'S NEWS

Oregon's Road Plans and Difficulties—The Legal Attack on New Jersey's Road Law—Officials Fight Epidemics in Montgomery, Ala.; Ravenna, O.; Chisholm, Minn., and Rochester, Minn.—South Bend's Typhoid Epidemic Cause Not Known—Denver Wins in Water Bond Suit—The Wanaque Plan—Ontario to Cut Street Lighting—New Jersey Gas Companies Fail to Get Lower Standard—City Managers in California Towns—Tacoma's Car Line—Jitney Litigation in Georgia—Status of New York City Zoning.

ROADS AND PAVEMENTS

New Wage Scale for Street Workers.

Columbus, O.—The city council has amended the ordinance fixing the salaries of officers and employes of the department of public service by ordering a new schedule of wages for the men in the division of engineering and construction engaged on street work and in the asphalt plant. The new scale is as follows:

Yard superintendent, $20 per week; foremen, each 50 cents per hour; pavers, each 45 cents per hour; assistant pavers, each .375 per hour; rammers, each .34375 per hour; bricklayers, each .70 per hour, or union scale; pipelayers, each .34375 per hour; tunnelers, each .34375 per hour; wagonmen, each .40 per hour; roller engineer, $21 per week; roller engineer, extra, .4375 per hour; painter foreman, .50 per hour; painters, each .45 per hour, or union scale; iron cleaners, each .375 per hour.

Asphalt Plant.—Superintendent, $170 first year; $185 second year; $200 thereafter; foremen, each .50 per hour; engineer, .40 per hour; mixerman, .30 per hour; drum fireman, .30 per hour; rakers, each .40 per hour; tampers, each .30 per hour; smoothers, each .40 per hour; roller engineer, .40 per hour; inspectors on street or sewer construction or repair, public or private contracts under jurisdiction of the division of engineering, .4375 per hour; masonry inspectors, $100 per month.

Road Plans and Problems in Oregon.

Salem, Ore.—The state highway commission has received official notification that the government has rejected the commission's request for post road co-operation in eliminating the Wolf Creek-Grave Creek grade on the Pacific highway near Grants Pass. Notification was received from B. J. Finch, acting district engineer for the government, at Portland, who announced that the secretary of agriculture has disapproved the project. This project, the estimated cost of which is $77,000 for five miles of road, is considered one of the most important in the state's entire program for road improvement, as it is the connecting link between California and Oregon on the Pacific Highway. The government refused to co-operate, on the basis of dollar for dollar, with the state on the technical grounds that the entire road could not be classified as a post road. The present road has a grade, in some places of 24 per cent. and is almost impassable. It is expected the highway commission will undertake to provide funds from other sources to make the improvement. Meanwhile there are 38 projects now receiving the attention of the state highway commission. These projects are in twenty different counties. They represent $2,263,115.21 and total about 190 miles of work and 10 bridges. This mass of work has been launched since June 5 and is the result of four months of activity. The most work will be done in Columbia, Clatsop, Douglas and Hood River. A survey of the 38 projects discloses the fact that the commission is emphasizing four trunk lines, three of which cross the state. The Columbia River highway, an east and west cross-state road; the Pacific highway, a north and south cross-state road, and The Dalles-California highway, a cross-state road running north and south through Central Oregon are being opened, graded and macadamized. The fourth trunk line is the Tillamook highway. The most important project is the West Side Pacific highway, of bitulithic, from Miltonburgh County line to Newberg, running 15.3 miles through Washington and Yamhill counties and costing $330,488.48.

Objections made by W. J. Lyons, manager of the American Surety Company, to the provision in the surety bond being required by the state highway commission of road contractors, to the effect that such contractors "must pay all just debts, dues and demands incurred in the performance of such work," are not valid, according to an opinion given by attorney general Brown to the highway commission. Mr. Lyons urged that this provision be omitted hereafter on the ground it is not authorized or required by law. The attorney general cites supreme court decisions to show that such a provision in a bond is strictly within the law, but he says the highway commission may modify it if the commission so desires.

Attack on Road Law Fails.

Trenton, N. J.—Application of Jersey City and Passaic as municipalities, and Charles P. Gillen of the Newark board of works as an individual, for a writ to review the Edge legislation providing for a state tax to raise $15,000,000 for construction of the state highway system, has been denied by chief justice Gummere of the Supreme Court sitting in Newark. The effect of this denial is that the only way left to get the Edge act into the courts to test its constitutionality, is by quo warranto, in which proceedings the attorney general would have to be a party. In denying the application for a writ to review, the chief justice found that in the application before him there were not sufficient reasons advanced to send the road tax legislation into the courts in an effort to upset it. Denial of the writ does not pass upon the validity of the legislation. This information was received in the Governor's office with great satisfaction, for if the writ had been allowed a litigation that would have covered at least two years would have ensued, and operation of the state highway laws would have been held up pending the suit. The significant feature of the decision was that nothing was found in the argument advanced by counsel indicating that the act is unconstitutional. Following a conference after the announcement of the decision George L. Record, who appeared for the cities of Passaic and Jersey City, said the application for the writ would be renewed before the entire Supreme Court at the opening of the November term.

The two principal grounds advanced in behalf of the municipalities attacking the act were that so-called second class railroad property would escape taxation and that the act would provide for the taxing of property of the Society for the Establishment of Useful Manufactures in violation of an ancient charter granted to the society and exempting it from local taxation. Chief justice Gummere said it might be admitted that second class railroad property, which consists of all property used for railroad purposes outside of the main stem or 100 foot right of way, would escape taxation under the original act. He called attention, however, to the supplemental act providing that such property should be taxed at the increased average tax rate which would result from adding the road tax to local tax rates and that the increase derived thereby should be turned into the road fund. Disposing of the contention respecting the Society for the Establishment of Useful Manufacturers, the chief justice held that the society could enforce its remedy by application to the court, which could then determine whether it is entitled to exemption from the road tax under its old charter. The court found no grounds to set aside the entire act merely because of the alleged invasion of the charter rights of the society. Chief justice Gummere said: "I am not interested in the trouble of the local and county boards in collecting the tax. The only thing I am interested in is the charge that the act is unconstitutional. I can't see anything in the act

which embraces railroad property. I do not think, however, that this makes the act unconstitutional. There is no attempt on the part of the Legislature to impose the burden directly on railroad property. Mr. Record states that the act does not embrace the property of the S. U. M. I believe that it does. A tax can be levied against this society, but by a charter granted it by the State it is expressly exempted from paying this tax. An assessment may be made against the corporation under this act, and it may pay it if it so wishes, but it can refuse to do so under its charter. I am at a loss to see how the Legislature violated any constitutional provision." In his application, Mr. Record asked merely for a judicial review of the tax act, and not the entire road act. He presented as his chief argument the fact that certain properties had been exempted from the assessment, citing railroad property and bank stock. He put this matter right up to the court to decide as a question of fact. On the decision of the court, declared Mr. Record, rested his argument, for he would contest the validity of the act on which ever way the court decided. Mr. Record also declared that the machinery for taxation in the act had not been properly set up. He questioned the right of the county board to order the collection of taxes in this. Governor Edge sent the best legal talent at his command to oppose the move. Appearing for the State were attorney-general John H. Wescott and assistant attorney-general Herbert Boggs. Conferring with State lawyers were senator Thomas F. McCran, of Paterson, who was a leader in drawing up the act, and county tax commissioner Congleton, a lawyer, of Essex County. While it is possible that conditions then existing might necessitate some change in the present program, no intimation of this kind has been given by the state highway commission whose engineers and other employees are working under pressure with the understanding that the work of construction will begin just as soon as the weather will permit in the spring. As outlined at the office of the highway commission here, the present plan is to carry on the construction work just as rapidly as funds will permit. The department has been advised by the state controller's office that the first proceeds from the tax levied under the road law of last winter will be available on January 20. Unless, therefore, there is some hitch in the plans suitable weather will alone be awaited before work begins.

Dismiss Bone Retaining Wall Patent Case.

Indianapolis, Ind.—The United States Circuit Court of Appeals has upheld the decision handed down last year by the lower court which dismissed suit for an injunction to stop infringement of the Bone patent for reinforced concrete retaining walls asked by the inventor against Marion County. Frank A. Bone, of Cincinnati, the inventor, claimed that a cantilever reinforced concrete wall at Indianapolis was an infringement on his patent. In the decision of the Court of Appeals, it is held that the type of wall in question was invented before its discovery and development by Bone, as proved by many publications, mostly European. The opinion of the lower court is also approved that the Akron case would have been decided against Bone had the same evidence as that presented in the Marion case been used then.

SEWERAGE AND SANITATION

City, State and Federal Officials Fight Epidemic.

Montgomery, Ala.—That the diptheria situation in Elmore county is well in hand and need cause the public no apprehension was announced as the result of tests made by the state laboratory. Cultures were taken from practically every white school child in Wetumpka and out of 340 cultures examined only 17 were positive while the remainder were negative. In every instance where a positive diagnosis was made, the child was isolated until two negative tests were shown. A sub-station of the laboratory will be established in Wetumpka under the direction of Dr. C. C. Lake, of the United States public health service, assisted by Dr. Vernon Robbins, field director of sanitation of the state board of health. Dr. H. G. Perry, of the state health department, announced that the danger was past and that the disease was under full control. It is said that one case occurred at Speigners, October 17, and that from then on cases continued to appear, one other being at Speigners, one at Weoka and the fourth out on the Mount Meigs road. These cases were promptly reported to the state health department by the Elmore county health officer, Dr. Justice, who had already taken steps to prevent a spread of the disease. He is given full credit by the other officials, for prompt and energetic action. According to the public health officials the spread was due to carriers, to mild unrecognized cases, and cases of nasal diphtheria; and when the school at Speigners was examined thirty-four out of the forty first examinations proved to be positive carriers. The school at Wetumpka was examined and among those examined the teacher of one of the grades was found to be a positive carrier. Out of the 125 taken at Speigners, eighty or ninety cultures examined by state bacteriologist Dr. P. P. Salter, at the state laboratory, all proved to be positive. The state health department stationed guards to prevent a spread of the disease into Montgomery county, and each and every person coming from the danger zone was questioned closely and investigation made to determine whether he or she was a menace to the health of the citizens and soldiers on this side of the river. Useless travel from the other side was prevented as far as possible. Houses in the zone where there were cases or carriers were quarantined. Military authorities at Camp Sheridan placed soldier guards at the bridge and ferry across the river so that no man in uniform passed into Elmore county.

City and State Health Officials Disagree.

South Bend, Ind.—The health department officials of the city and the state are still wrangling over the cause of the typhoid fever epidemic which recently occurred in this city. A heated interchange of letters, charges and recriminations marks the controversy. Dr. J. N. Hurty, state health commissioner, following the report of his investigators, attributes the greater part of the epidemic to the general insanitary conditions in the city, while Dr. Charles Bosenbury, secretary of the city health department, blames the water supply. The water situation is still baffling the authorities and the state officials have given up the investigation. In tests conducted at the water pumping stations daily it was found that at times the water tests good and at other times it showed contamination. Chlorination apparatus has been installed. The epidemic of typhoid was first discovered here last April, but there was no evidence that the water was contaminated. H. H. Felder, local pathologist, did not discover the contamination until August 23. Since the water system in South Bend is an inter-communicating system it is possible that contamination did not get into the mains at the testing point. The typhoid epidemic has been in an area supplied from the central station all during the year, but has now spread. Dr. Will Shimer and John Diggs, sent by the state board to South Bend on September 15 last to conduct an investigation into the typhoid epidemic, prevalent in the city, are charged with carelessness, negligence and incompetence by Dr. Bosenbury, in a letter to Dr. Hurty at Indianapolis. The letter says in part:

> Within a few days a number of drafted men were to be sent from the city to the camp at Louisville. Therefore, we felt it necessary to notify surgeon-general Gorgas that typhoid was epidemic in the city, and I received a telegram advising that surgeon J. O. Cobb would come to South Bend for a conference with the board of health. Mr. Diggs later expressed his opinion that it was not pleasing to have federal aid called in before state authorities had had a chance to make their investigations. It was explained to both Mr. Diggs and Dr. Shimer that we had not asked for federal aid; that passenger trains going through South Bend used South Bend water, and that the United States public health service had jurisdiction.
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> Our duty in the matter made it imperative that we give the representatives of the state board of health every fact and every clue possible. As a result of our reports Dr. Shimer announced his conviction that this was not a water-borne epidemic. He rather jumped to the conclusion that it was milk-borne.
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> Dr. Shimer, in company with dairy inspector V. C. Cripe,

visited a number of patients in their homes. So far as I know every possible opportunity was given Dr. Shimer to make his investigation complete, searching and thorough.

We invited Mr. Diggs and Dr. Shimer to attend a meeting of the St. Joseph County Medical society. Dr. Shimer gave his report as did Mr. Diggs. Mr. Diggs seemed willing as a result of his investigation, which, by way, did not include a single analysis of the city water, to absolutely absolve the city water supply from any responsibility as a possible cause of the epidemic. I asked him at the time if he would be willing to make a written statement to that effect and sign it. This he declined to do. Mr. Diggs, so far as he was concerned, had eliminated the water as a possible source of infection. Dr. Shimer would not characterize the epidemic as milk-borne; conclusive evidence that it was milk-borne was lacking. They, therefore, fell back upon glittering generalities, outhouses, careless physicians, general insanitary conditions, etc., had operated to bring on this typhoid outbreak. The opinion has been expressed at their offices in Indianapolis as in the field at South Bend.

There has been considerable disgust and criticism expressed by citizens of this community with the report made by the representatives of the state board of health. It is only fair to you and to them to inform you that it is felt that the superficial manner in which Mr. Diggs and Dr. Shimer attacked the typhoid problem in South Bend is totally unworthy of the state board of health and an insult to the citizens of South Bend, the local medical profession, and, especially to the pathologist of the South Bend Medical laboratory.

We very much regret the necessity for sending you such a letter. In our emergency we asked for assistance. We felt we had a water-borne epidemic. We, who have lived in South Bend for a long time, have had unlimited confidence in the city water supply, and yet, when the local laboratory reported the presence of pollution and b. coli there was nothing for us to do, both the health department and the water department, but to notify the people and warn them to boil the water until the matter could be completely investigated. The sudden rise in the number of typhoid patients coming as it did on schedule time with reference to the reported pollution of the city water supply made us believe then, as we have every reason to believe now, that the city water was chiefly responsible for this typhoid epidemic. The presence of b. coli has been confirmed by Dr. Akin in samples taken by him during his stay in South Bend.

Classing South Bend as the dirtiest city in the state and scoring many of the physicians there for "thinking of the money they were to get rather than medical services they could render," Dr. Hurty, state health commissioner, made a strong statement about the letter of Dr. Bosenbury:

Dr. Bosenbury certainly was peeved because the state health department investigators did not report the cause of the typhoid epidemic just what Dr. Bosenbury thought it was. My men carefully investigated the water supply at South Bend, and they reported that in most analyses the water was not contaminated and only in a few instances did they find any suspicious germination.

It is the insanitary conditions in the city that caused the widespread typhoid epidemic, my investigators reported. Dr. Shimer visited 54 homes in South Bend, and in not one instance had the attending physician given advice as to how to prevent the spread of the infection nor did he recommend anti-typhoid vaccination. Dr. Shimer reported that he found typhoid germs in most of the homes he visited. The back yards were filthy. No effort had been made to ascertain whether the milk supply could have helped in spreading the fever.

Dr. Shimer stated that when he attended a gathering of physicians to discuss the epidemic and ways of abating it, the physicians quarreled and wrangled as to how much should be charged for administering the anti-typhoid vaccination. The physicians finally compromised on a flat $5 a head fee, but they never discussed any phase of abating or preventing further spread of the epidemic.

H. E. Barnard, head of the state laboratory, has made countless analyses of the South Bend water supply, and says the water supply was not responsible for the greater part of the epidemic. John Diggs, an investigator mentioned by Dr. Bosenbury, who is a careful and competent sanitation engineer, said the water supply was obtained from deep driven wells and was of good quality.

Dr. Cobb, of the United States public health department, visited South Bend recently and stated to me: "I think that it is possible that the water supply was a part cause for the epidemic, but the open outhouses and bad sanitary conditions caused the epidemic." Dr. Fox, of the United States public health department, conducted a survey of South Bend a year ago and reported the same conditions as Dr. Cobb.

Dr. Bosenbury's letter and his charges are all buncomb.

Contractor Wins Damages in Sewer Case.

Milwaukee, Wis.— Joseph Hanreddy, Chicago contractor, who sued the city of Milwaukee for alleged damages totaling about $425,000, has been awarded $115,000 in the United States district court. Assistant city attorney Walter Mattison gave notice that the city would appeal the case from the verdict of the jury, claiming that the amount allowed was excessive. The suit went to the jury on three counts. The Hanreddy contract with the city was entered into on April 29, 1913. The first step toward the erection of the new intake tunnel was taken by alderman E. A. Wittig in 1912, when he introduced a resolution in the common council for the construction of the Linwood avenue intake tunnel. Alderman Wittig wanted a tunnel nine feet in diameter, but the council, upon the recommendation of the water works department, directed that a twelve-foot tunnel be built. Work was started within a month from the award of the contract on the shore shaft. Shortly after the contract was let, the city engineer ordered that the shore shaft be built of reinforced concrete, instead of brick as called for in the specifications and the city paid for the extra work entailed. A controversy arose on the question of reinforcing the tunnel, Hanreddy claiming that it was not required under the plans and specifications. He was ordered to put in the reinforcement by the city engineer for which he put in an extra charge of approximately $54,000. After the tunnel had been driven a few hundred feet, the city engineer's office submitted a report recommending that the plans for building the tunnel be changed by abandoning the proposed lake crib, 4,000 feet out in the lake, and extending the tunnel a considerable length. Objections were made by city attorney Williams and his staff to paying the money asked by Mr. Hanreddy, and litigation followed. Mr. Hanreddy claimed, among other things, $28,915 for personal services; $54,758.75 for pumping, labor, etc.; $40,345.82 anticipated profits on the lake shaft; $950, anticipated profits on the shore shaft; $2,100 extra premiums on bonds; $32,785 for extra work for reinforcement, and $3,674.54 for extra crib outlay.

Epidemic Closes Public Buildings.

Ravenna, O.—On discovering that the number of cases of smallpox in town had reached thirty, the board of health banned all public meetings, including schools, Sunday schools, church services, picture shows and political mass meetings. The disease is mostly in light form and the board of health reports that it has the situation well in hand.

State Aids in Typhoid Epidemic.

Chisholm, Minn.—With fourteen cases of typhoid fever reported here in forty-eight hours, the state is investigating to ascertain the cause of the spread of the disease. Dr. L. J. Burns, inspector of the state board of health, has been sent here. The local health board is unable to give a reason for the appearance of the disease. Water is obtained by Chisholm from one of the mines, which always has been considered free from contamination.

Diphtheria Epidemic in Insane Hospital.

Rochester, Minn.—Facts of an epidemic of diphtheria at the Rochester State Hospital for the Insane in which positive cultures were otbained from 261 patients and three nurses, of whom about twenty-five are still suffering with the disease, have been made public after nearly three months of secrecy was maintained by the state board of control and the state board of health. The existence of the epidemic was admitted by the officials only when a move was made to secure a "calamity" appropriation of state funds with which to rebuild the dairy barn at the hospital and to complete a new pavilion, which is desired as an isolation hospital. C. J. Swendson of the board of control said no announcement was made of the epidemic that relatives of patients might be spared anxiety. The epidemic began about July 15 and 250 patients and attendants were sick at one time. The condition was made more difficult to handle, it was said, because of the overcrowded condition of the hospital, which forced many patients to sleep on mattresses on the floor in the halls. State health officials said that on the completion of the new pavilion the active cases may be isolated and the epidemic will be ended quickly.

Fight River Pollution by Munitions Plants.

Bay City, Mich.—Papers have been served on the representatives in Michigan of the Du Pont Powder Company, restraining them from dumping creosote and other refuse from their mill at Grayling into the Au Sable river. A temporary injunction, asked by the state has been granted by Judge Howard Wiest, of the Ingham circuit. The judge did not issue the usual order to show cause why the injunction should not issue, but made the mandate at once on the showing made by the state. State

officials are worried. Three departments, the attorney general's, the game commissioner's and the state board of health are working to stop the pollution of the river. Chemical refuse from the mills, as dumped into the Au Sable, was brought to Lansing and used as a basis for experiments by the state chemist connected with the state board of health. This morning these chemicals undiluted killed goldfish in six minutes; diluted one-half it killed goldfish in 18 minutes, and diluted two-thirds, the fish managed to survive almost an hour. On one night game wardens with acetylene lamps searched the Au Sable for ten miles below Grayling and could not find a single trout. The Au Sable has been for years Michigan's greatest trout stream, and as such is known from one end of the country to the other. The killing of its trout is looked upon by the state officials as nothing short of a calamity. The state expects the Du Pont people to make a motion to dismiss the injunction on the ground that the plant is working on war munitions. According to the Du Pont chemists, there is no way by which their work can be carried on successfully without the dropping of this refuse which is so fatal to fish life.

WATER SUPPLY

City Again Wins in $8,000,000 Bond Suit.

Denver, Colo.—The United States supreme court has sustained the Circuit Court of Appeals decision in favor of the city in the suit of the Denver Union Water company attacking the validity of the $8,000,000 bond issue of the city for a municipal water plant. The case decided is known as the Wheeler-Lusk suit and it finally ends the controversy over the bonds, but it has no connection with the water rate suit argued a few weeks ago before the United States supreme court. The case now definitely disposed of by the highest court has been in the courts for nearly five years. After the citizens of Denver voted $8,000,000 bonds for the city to construct a municipal water plant, the validity of the bonds was attacked by the Denver Union Water company in the names of Frank T. Lusk and Mrs. Clara A. Wheeler, stockholders in the company. Judge Lewis first refused to hear the case, alleging that he was without jurisdiction. The water company, through Hughes & Dorsey, its attorneys, appealed to the United States supreme court, and it was held that Judge Lewis did have jurisdiction. Judge Lewis then tried the case and decided in favor of the city. The water company then appealed to the Circuit Court of Appeals and the decision of Judge Lewis was sustained. Following this action the water company's attorneys applied to the United States supreme court for a writ of review by supersedeas. This, it is explained, places a discretionary power in the hands of the supreme court; in other words, the court could grant or refuse the writ. The court refused the writ. This refusal, therefore, sustained the Circuit Court of Appeals and makes its findings final. The $8,000,000 bonds were voted for the construction of a municipal plant and cannot be used to purchase the present plant, it is explained by the lawyers. The action of the supreme court makes valid these bonds so that if the city decided to construct a municipal plant they would not be questioned.

Paterson Joins Newark in Wanaque Plan.

Newark, N. J.—Paterson will join with Newark in making a contract for the development of the Wanaque watershed, paying half of the estimated cost of $8,560,000. This was announced by mayor Radcliffe and city counsel Scott of Paterson to the North Jersey District Water Supply Commission and Newark city officials. No other municipalities offered to join at this time. Although Paterson had united with this city last spring in asking the Water Commission to undertake the development, when it came to the point of making a contract for the work Paterson withdrew, leaving Newark to bear the cost alone until such time as other cities should come into the scheme. There had been no expectation that Paterson would get into the project so soon as the present, but it was explained by that city's representatives that the reason the municipality withdrew in the spring was that it had been advised that the proceedings at that time were not legal in view of the court action brought by the Society for Establishing Useful Manufactures to prevent the execution of a contract. Paterson officials were advised also at that time that they would be in contempt of court if they participated in the contract. That Paterson had taken this view last spring was not known for the reasons stated in the spring for its withdrawal were that it felt it would be better first to acquire the distribution system of the East Jersey Lake Company in its streets before taking steps to get more water, and that the cost would be too much for the present. After Newark made its contract with the water commission it abandoned the contract because of the S. U. M. action. The understanding is that no further steps will be taken toward the making of a new contract until the new city commission takes office in this city. The board of works, if it chose, could proceed right up to the point of making a contract before the Court of Errors and Appeals decides on the appeal of the S. U. M., because the Errors Court agreed that further proceedings should not be stayed prior to that point. The cost, if Newark had gone into the project alone, would have been $8,060,000, but with Paterson also participating an extra $500,000 will be added to the cost, this representing the cost of a pipe line to Paterson. Each city at the outset would take 10,000,000 gallons of water daily, and would divide the cost of the development evenly. It was explained by the Paterson officials that that city would eventually acquire the distribution system of the East Jersey, either by purchase or condemnation, and that this system could be obtained by the time the water should be ready from the Wanaque. On behalf of Glen Ridge, councilman Moran of that municipality has repeated its offer to enter the project eventually, though at present it could not state at what date. The next step in the proceedings is for the water commission to prepare a form of contract and submit this to the two cities. It is unlikely that the contract will be submitted to Newark until the city commission is installed. At the November term of court the appeal of the S. U. M. from the Supreme Court decision on litigation it brought will be heard. At that time also the S. U. M. may request the court to stay the execution of a contract until the court's decision is given.

To Build New Filter Plant.

Newport News, Va.—The extensive physical improvement in cities caused by war activities of the Government is well shown in the example of this city. The Newport News Water, Light & Power Company has contracted with the Roberts' Filter Manufacturing Company, Darby, Pa., to build an eight-million-gallon concrete gravity filter plant, fully equipped with operating tables and hydraulic valves. The work is to be rushed under the approval of the Federal Priority Committee because of the varied interests of the Government in this city and the increased demands upon them. The installation will supersede a four-million-gallon pressure filter plant which has been in successful operation, but which, it is calculated, is not as successful as the gravity system will be. The estimated cost of the work, together with other improvements, will be about $400,000.

STREET LIGHTING AND POWER

To Restrict Street Lighting.

Toronto, Ont.—"The shortage of power from the Niagara district is so intense that the munitions plants are suffering and other factories are not able to secure sufficient power to maintain their outputs." This was the chief reason given by Sir Adam Beck for action taken by the Ontario Hydro-electric Power commission which will result in restriction of the use of Hydro current in the municipalities of the Niagara district. Sir Adam sent to the Niagara district municipalities a communication pointing out that it will be necessary to limit street lighting and sign lighting, as well as power to customers during the peak hours. It is probable, therefore, that some twenty cities and towns on

the Niagara district system, including Toronto, Hamilton, London, Brantford, St. Catharines, Niagara Falls, Stratford, Chatham, St. Thomas, St. Mary's, Windsor, Woodstock, Kitchener, Galt, Hespeler, and other places will be in comparative darkness, so far as street lighting is concerned, between the hours of 5 and 8 in the evening, unless steam reserve plants that may be available in some of the municipalities are used. The action taken was rendered necessary, Sir Adam further explained, because of the situation brought about by the stopping of the supply of power from the Electrical Development Company. "The Government has not yet issued licenses for this year restricting the export of power, in consequence of which there is a serious shortage," he stated.

Lower Gas Standard Refused.

Trenton, N. J.—Consumers of gas in New Jersey have won their fight against the gas companies in this state on the application made to the Board of Public Utility Commissioners for an order allowing a reduction in the standard of the commodity, which would have amounted to greatly increased costs to the public. Constituting one of the most important decisions of its kind, the commission's report holds that "from all the testimony we conclude that the board is not warranted in disturbing the present rule." That the action of the 14 companies generally termed subsidiaries of the Public Service Gas Company, which concern was also a party in the matter, was in reality a request for increased rates, made pretentiously, is inferred by a section of the report, which states that if existing rates are no longer just, a specific and direct application should be made for sufficient rates, and that "the situation is not to be met by substituting for a proper and adequate service, a service which may be inadequate." The matter was brought before the commission in February last under a petition filed on behalf of the Bridgeton Gas Light Company and 14 other gas concerns, asking that an alteration or amendment of rule 9 of the board be made calling for the reduction of the requirement of the monthly average of heating power in gas. While that petition was pending the Public Service Gas Company filed a petition seeking the suspension or reduction of the requirement as to calorific value. The standard of gas required to be supplied to the consumer, which will now be maintained, was fixed by the commission in October, 1911, after a number of hearings, at which were present representatives of gas companies, municipalities, institutions of learning, other state commissions and experts from the National Bureau of Standards. Hearings have been held during which among the most able attorneys of this state battled for both the municipalities opposing the issuance of the order, and the gas companies. George L. Record, who represented the city of Passaic with A. O. Miller, was a conspicuous figure throughout the proceedings against what he at one time termed "the gouging of the public by the domineering and all-powerful special interests." Trenton was represented at the hearings by city counsel Charles E. Bird. In the applications, the reasons advanced by the companies for requesting the order by the commission were: The increased cost of manufacture and distributing of gas; that the consumer can burn more efficiently in ordinary appliances a leaner gas than that of the present value, and that the necessities of war require furnishing additional quantities of benzol and toluol for the manufacture of explosives, which substances can be secured only by washing the gas of the light oils and reducing below the present standard the calorific value. The proceeding being not intentionally a rate case, the commission in its ruling points out that the question of cost is therefore related only in so far as the purpose of establishing a standard is to provide a calorific or heating value that is practicable and economic, it holding to be true that a gas of higher value than is reasonably required for the uses of the consumer, or of higher value than can be efficiently used, should not be demanded. The board declares that the proof on the question of cost is meagre, and not sufficient to show that the cost of producing the gas of the present standard is, under ordinary conditions, excessive, nor that any difficulty is encountered in manufacturing gas of the present standard. In the claim of the companies that the need of toluol in the manufacture of explosives makes it necessary to recover light oils, the report states: "No one can resist such an appeal if supported by proof. In fact, one is led unconsciously to weigh every consideration most heavily in favor of supplying to the government and its allies, every possible aid, and the board unhesitatingly asserts that if the proofs showed that necessary materials could be supplied by granting this application, which otherwise would be denied the federal authorities, we would promptly grant the petition." After such action, however, the board held that the question of whether under the new conditions, the existing rate was just and reasonable would be taken up. Testimony taken by the commission on the subject is pointed to as proof that the contention of the companies could not be verified and that in fact only large gas producers would be likely to install, or be warranted in installing apparatus for the recovery of those materials. It was further held, according to the report, that no benzol or toluol was reported as having been produced in the manufacture of water gas. It was still further shown by experts that benzol is actually added to enrich the gas after the benzol and toluol have been separated. It is suggested in the decision that if the supply of toluol was inadequate to meet the needs of the federal government, and if the need of augmenting the supply demanded the lowering of standards of heating value of gas, direct representation would have been made by the Government, which was not done. "Taken as a whole," says the report, "the proofs fail to show with any degree of certainty that a material addition to the available supply of toluol would follow upon the lowering of the standard." In the matter of the contention that the consumer can burn more efficiently in ordinary appliances a leaner gas than that of the present standard, the commission also finds lack of proof, and says experts do not support the claim that the present standard is higher than is required in adequate service. The conclusion is given that the fixtures are now generally adjusted to the present standard, and nothing shows that under present conditions any trouble has resulted to the appliances making for inefficient service. On the other hand, it is held to be apparent that if the prevailing standard were lowered, confusion and difficulty would be experienced until new adjustments were made.

Company Would Abandon Service and Sell Pipe.

Hope, Ind.—Suit has been filed in the Bartholomew county circuit court at Columbus by the Fuel Gas Company of Indiana, asking that it be permitted to abandon serving the town of Hope, in that county, with natural gas. The action is an appeal from a ruling of the Indiana public service commission denying the request of the utility. It sets up the declaration that for several years the company has been supplying natural gas to Hope, which has a population of about 1,200. This gas comes from the Rush county field, a distance of about eighteen miles. The company's original investment, the complaint says, was $25,000, and from time to time since then it has been necessary to clean out the old wells and drill new ones to keep up the service. "Considering the amount of money invested and considering the fact that the supply of natural gas must soon become entirely exhausted, the dividends to plaintiff's stockholders have been small," the complaint avers. Speaking of war conditions the complaint says that "because of the advance in pipe due to the war in Europe, the pipelines alone, belonging to plaintiff, have now, and for many months have had, a market value of more than $60,000; and that the pipelines extending from said town of Hope to said gas field have a market value of $50,000." It will be necessary, it is alleged, because of the fact that the supply of natural gas is becoming exhausted in the Rush county field, to put in a gas pumping station at an expense of $8,000, and a gas holder at an expense of $22,000. The company prefers to give up its business at Hope and sell such gas as it has to Waldron, St. Paul and Shelbyville. This can be done with about seven miles of pipelines. Just as many people will be served, it is declared, and the company will be able to take up several miles of mains leading to Hope and sell them at a great profit, due to the war prices. Last summer

the gas company surrendered its franchise at Hope and elected to operate under an indeterminate permit from the public service commission. Later the company filed a petition asking the commission to permit it to discontinue serving Hope with natural gas. Residents of Hope protested, and the commission decided in favor of the gas users. The town of Hope then filed an action in the circuit court here, asking for a restraining order against the Fuel Gas Company, which it was alleged, in violation of the commission's order, was taking up its mains and getting ready to leave Hope without any natural gas supply whatever. The public service commission found, when it considered the evidence in the Hope situation, that, although the claim was made that the company had property valued at $25,000, the property had been sold to A. B. Ayers and some associates, of Fortville, Ind., in May, 1917, for $17,000. Using this sum as a basis for calculations, the commission learned that the company had been earning something more than 21 per cent on its valuation. In its ruling, the state board pointed out that, owing to the unprecedented demand for gas pipes of all sizes and the inability of the users to procure it, second-hand pipe was worth, in many instances, more than new pipe could have been bought for a short time ago. This condition, the commission added, created a desire to sell, as in the present case, where property bought for $17,000 could be disposed of for $45,000. So long as the profits of the business yielded more than 21 per cent on the investment of the present owners and more than 8 per cent on the price offered for the property, the commission believed there was no reason why the public service should be abandoned over the protest of the people of Hope. The commission said: "This commission will not willingly permit the abandonment of a public service solely to enable the investors to reap a fabulous return on their investment."

FIRE AND POLICE

City in Darkness When Plant Burns.

Traverse City, Mich.—Fire which destroyed the $50,000 power plant here, owned by the Boardman River Power Company, practically left this city without any electrical power or lighting facilities and many plants may be forced to close down. One employee was so badly burned he may die. An explosion caused, it is said, by a hot box set the building afire just before daylight.

Explosion and Fire in Lumber Plant.

St. Louis, Mo.—Fire, following an explosion which shook houses for blocks around, caused heavy damage to the plant of the Hill-Behan Lumber Company and the Wabash Railroad tracks, St. Louis County. The loss is variously estimated at from $100,000 to $150,000. The explosion occurred in the sawmill, partly wrecking the building, and within a few minutes it was enveloped in flames. The blaze quickly spread to lumber piles adjoining the building. The fire had gained such headway upon the arrival of the Universal City department that four St. Louis companies were pressed into service. According to marshal Willmann he heard the explosion fully three minutes before the fire started. He was several blocks away. Firemen were handicapped in fighting the blaze on account of the low water pressure. The water had to run through 1,500 feet of hose and only three streams were used.

Bring Fire Apparatus on Tugs.

New York, N. Y.—Three buildings of the House of Refuge on Randall's Island, a state reformatory for boys, were destroyed by fire, causing a loss of $100,000. A fire department of about one hundred boys in the institution tried to fight the fire with a small engine and strings of small hose, but it spread so rapidly that E. C. Barber, superintendent of the institution, had to send a call for city apparatus. Two fireboats were sent to the island and fire chief Kenlon sent out two alarms for apparatus, and finally transported five engine companies to the island on tugs. The fire had burned out an end of the brick school building when the engine companies arrived from Harlem, but the lines of hose were strung so quickly that the flames were checked before they could reach one of the dormitories only a few feet from the end of the school building. The laundry and the dry room were completely destroyed, however, and firemen said the damage to the school building was so great a new building would have to be erected. About $20,000 worth of new winter clothing ready for issuance to the inmates was destroyed in the lundry.

GOVERNMENT AND FINANCE

New City Manager Appointed.

Hanford, Cal.—Jay Hinman of Bakersfield has been named city manager by the city trustees. His salary will be $150 a month. Trustee Pepper was to have received the job, but would not vote for giving himself a salary. A deadlock resulted for several months.

City Wants Manager.

Santa Barbara, Cal.—This city is to have a city manager when its new charter goes into effect the beginning of next year. The council-elect has selected a committee to receive applications from aspirants to the position until December 1. The committee asks that the first letter of candidates should state qualifications and the salary expected and should include adequate references. The salary is not fixed in the charter, but will be "dependent on the man." Santa Barbara has a population of approximately 20,000.

English City Gets Big Income from Enterprises.

Bradford, England.—The city of Bradford during the year ended March 31, 1917, derived an income from its trading undertakings amounting to $5,529,828. The aggregate amount of working expenses was $3,611,279, leaving a gross or trading profit of $1,918,549, which represented 5.10 per cent upon the total capital expenditure on these undertakings, namely $37,643,365. Of the debt incurred, $12,468,153 has been repaid or is available in the sinking funds, leaving a net debt of $25,175,212. The amounts applicable to the respective undertakings are as follows:

Undertakings	Expenditure during the year	Total capital expenditures	Loans repaid and sinking funds in hand	Net debt
Waterworks	$325,204	$19,712,712	$4,328,557	$15,384,155
Nidd Valley Lt. Ry.	341	305,071	29,666	275,405
Tramways	394	5,076,416	2,271,176	2,805,240
Gas works	95,481	6,101,895	2,651,688	3,450,207
Electricity works	275,351	4,822,045	2,285,338	2,536,707
Markets		1,346,896	830,998	515,898
Conditioning house	54	278,330	70,730	207,600
Total	$696,825	$37,643,365	$12,468,153	$25,175,212

The Bradford city tramways for the year ended March 31, 1915, made a net profit of $149,898 as compared with $144,881 in the previous year. Traffic expenses, including wages of employees, war bonuses, and allowances to dependents of men serving in the army, showed an increase, but expenditures on repairs and maintenance both of rolling stock and lines have necessarily been deferred. The Bradford sewage works for the first time in its history met all its expenses without any assistance from the rates, having received $389,320 from the sale of grease extracted from the city's sewage. The city's rates for the current year have been reduced by 6d. (12 cents) in the pound sterling ($4.86), the figure now being 9s. 3d. (2.25); but when this reduction was announced the rate payers were reminded that a considerable proportion of the saving effected by the various municipal departments was but temporary.

TRAFFIC AND TRANSPORTATION

Company to Operate Municipal Car Line.

Tacoma, Wash.—The city is arranging with the Tacoma Railway & Power Company for the operation of the Municipal Car line on the tideflats by the company. The provision of the contract are summarized as follows: The company is to operate the city's car line for two years at actual cost; the company furnishes car barns, shops and storage yards, but is not responsible for any injury or damage to the cars; the company will operate the lines according to schedules arranged by the city, with equip-

ment and facilities furnished by the city and under the direction of the city superintendent; the company will turn over to the city treasurer money received during the month's operation; the bill of cost shall be paid by the city to the company monthly to include power rate at .75 cent per kilowatt, and the actual cost of repairing the entire system. Further clauses provide that the city shall pay for moving the cars, their repair and inspection, and not hold the company liable in damages and claims. The bill of cost will include charges for general expenses agreed to by certain officials of the city and company and passed on by the public service commission. The city will receive 2 cents and the company 3 cents on all transfers in the city limits, and the company 3 cents and the city 2 cents for all transfers outside of the city limits. In case the city desires to operate the St. Paul avenue line they will pay a sum equaling 12 per cent per annum to cover certain depreciations. The contract will be considered null and void if the city acquires all or a majority of the company's lines in the next two years. A proviso calls for the public service commission to act as a board of arbitration between the city and company in case of trouble.

Grade Crossing Elimination Law Constitutional.

Trenton, N. J.—New Jersey's railroad grade crossing elimination law has been declared constitutional in an opinion filed in the Court of Errors. The act, passed during the administration of Governor Fielder, was attacked by the Erie Railroad Company. The act was reviewed on an order issued by the Public Utility Commission, directing the Erie Railroad Company to eliminate within eight years a number of grade crossings in Paterson. The cost of this work is estimated at about $3,000,000. This order was taken into the Supreme Court by the Erie and there affirmed. The present Court of Errors decision affirms the decision of the Supreme Court, and the effect is that the Erie will now have to proceed to eliminate the Paterson grade crossings. The decision is of sweeping importance in this state, as it leaves with the utility commission the power to order abolition of grade crossings after they have been proved to be dangerous.

Jitneys in Georgia Lose Case.

Atlanta, Ga.—The jitneys in this state were defeated for the third time when the supreme court held that the Atlanta ordinance regulating jitneys and requiring them to have bonds is valid. The ordinance was passed in April, 1915. The jitneys appealed to the court against the Railroad Commission taking jurisdiction, but the court held that since the commission had enacted no regulations there was nothing to decide. It is expected that this may prove to be the final defeat of the jitney bus in the state. The jitney men have expressed their determination to carry the fight against the ordinance to the Supreme Court of the United States. Fifty members of the Atlanta Jitney Bus Association have pledged their support to a scheme by which 150 jitneys could supply transportation for soldiers at the Camp Gordon cantonment. The traffic committee of the association has proposed the organization of the People's Transportation Company to operate trains of motor trucks from the camp to a terminus in the city, each truck to carry eighteen people and to draw four trailers carrying twelve people each.

MISCELLANEOUS

Zone Law Case Appealed.

New York, N. Y.—The validity of the so-called building zone resolution of the New York City Board of Estimate and Apportionment, which divided the city into three classes of districts, has been attacked in the Court of Appeals at Albany in the case of Estelle P. Anderson against Steinway & Sons. The action was brought for a specific performance of a contract for the sale of property. The appellant filed an answer in the lower court, admitting that the plaintiff was willing to fulfill the contract on her part, that she tendered a deed of the premises on August 1, 1916, and that the defendant refused to pay the balance of the purchase money. Steinway & Sons alleged that the Board of Estimate and Apportionment of the City of New York, subsequent to the signing of the contract and under the power conferred by the laws of 1916, passed a building zone resolution, and that the block where the plaintiff's property was located was a residence district. Steinway & Sons insisted that the resolution placed an incumbrance on the property and that the plaintiff therefore was unable to convey title to the property and that the plaintiff's title was unmarketable. Meanwhile, in a letter to the Board of Estimate, the City Club of New York, through its president, Nelson S. Spencer, has filed a vigorous protest against a proposed blanket extension of building permits, which if granted now would be in violation of the zoning law. In the summer of 1916, at the time of the enactment of the zoning law, a number of these permits were granted. Persons holding them were given a year in which to construct the new buildings, up to and including the second tier of beams. Certain interests are now actively at work endeavoring to have this concession extended another year. The Board of Estimate's Committee on City Plan has suggested that in cases where actual construction or fabrication has been begun the Board of Appeals may extend the permit for not to exceed six months. This latter provision, the City Club believes, will safeguard the public and at the same time afford adequate relief to persons who have in good faith acted on the permits granted. The proposed amendments are: "So as to extend for one year the time allowed for the completion of the ground story framework of buildings, permits for the erection of which were issued under the resolution," and "so as to authorize the Board of Appeals to extend such time for six months in cases coming within condition outlined in the report of the Committee on City Plan." The letter says: "The City Club is opposed to the first of these proposed amendments of the zoning law, which would provide blanket extension of the permits under consideration for one year. We are in favor of the second amendment which would permit the consideration by the Board of Appeals of those cases which merit equitable relief. Last June we filed with the Committee on City Plan of your board a memorandum indicating our position. In July, 1916, when your board adopted the present zoning resolution, it went out of its way to be considerate to persons who then contemplated the erection of buildings. It gave to all who had filed applications up to July 25 and who received permits between that date and October 25 one year in which to complete their proposed buildings to and including the second tier of beams. In so doing your board set up a measure by which the intention and the good faith of prospective builders could be tested."

Show City Plans at Fair.

Sherman, Tex.—Following the employment of George E. Kessler, the St. Louis city planner, by the city commission to replan the city, the management of the Red River Valley Fair arranged for a city plan exhibit which was shown under the personal supervision of Mr. Kessler during the recent fair.

To Test New Park Law.

Indianapolis, Ind.—Suit to test the constitutionality of the new park, boulevard and playground law, passed during the last session of the legislature, has been filed in superior court. The new law provides that cities of the first class may, by popular vote, create a park and boulevard corporation separate and apart from the municipality, the corporation to have under its care the construction and laying out of parks, boulevards and playgrounds, the funds to be derived from a special assessment levied for the purpose of constructing and keeping in repair this part of the city. The law was advocated by Republican members of the house of representatives in the last session as the proper way to divorce the park control system from politics and to conserve the resources of the city in the construction of parks and playgrounds. Under the present system it is said certain parts of the city can not obtain the park boulevard and playground advantages that other sections enjoy because of the low value of property in these neighborhoods. The mayor and the members of the park board are made defendants in the test suit, as they are charged with the administration of the law.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Tax Association

Announcement is made of the eleventh annual conference on taxation held under the auspices of the National Tax Association, an organization of taxing officials and leading specialists and business and professional men in the United States and Canada. The conference is to be held at Atlanta, November 13-16, and is composed of delegates appointed by the governors of states, state associations of accountants and by university presidents. Previous conferences have been attended by delegates from a large majority of the states and it is likely that with the great general attention now devoted to the subject, this conference will be the largest ever held.

The practice of the association is to subject the various formal addresses to analysis and discussion by means of "round table" sessions, at which the proposals are debated and criticised with the result that a general consensus is reached as to disputed points. The entire proceedings are published in book form and thus made available for general reference. These volumes are widely distributed, being found in a large number of public libraries throughout this country, in Canada and abroad.

An important place will be assigned at this conference to Federal tax problems, which it may be assumed will provoke interesting discussion of the new taxes now being devised in Washington. It is expected that representatives of the Federal Government will be in attendance. Professor E. R. A. Seligman will make an address on some phase of war taxation and a report will be made by a committee on Federal taxation. A session will be devoted to addresses on corporation taxation, including a paper on the taxation of business by one of the leading experts.

The initial move will be made in a comprehensive plan to suggest and elaborate a so-called "model system" of taxation which it is hoped that the various states may be led to draw upon from time to time, thus carrying out a much needed co-operation toward uniformity in taxation and an abandonment of conflict due to overlapping jurisdiction. Reports will be made of interesting experiments which have been taking place in Canada. A comprehensive discussion of the problems of securing efficiency and care in the making of local assessments will be considered by a group of the most experienced tax administrators in the country. The present decided trend toward income taxation by the states will be thoroughly discussed by the leading experts in that particular field.

Along with its study of methods of taxation the association has always emphasized the need of careful attention to expenditures, economy and efficiency in governmental costs and a committee is charged with the development of this feature.

The wide scope of the discussions is indicated by the fact that the program will carry addresses by persons in close touch with the situation in upward of twenty states in all parts of the country. The governors of the various states, university presidents and the premiers of the Canadian provinces, in their replies to the invitation extended by Governor Dorsey of Georgia, have expressed a deep interest in the conference and have already named official delegates in many cases. Several governors have announced their intention to attend. The public is cordially invited to attend the conference and participate in the discussions.

Samuel T. Howe, chairman of the Kansas Tax Commission, is president of the association, Professor Charles J. Bullock of Harvard is vice president and Professor Fred R. Fairchild of Yale University, secretary. The executive committee includes leading taxing officials throughout the country.

Further details and copies of the program may be obtained from A. E. Holcomb, treasurer of the association, 195 Broadway, New York.

League of Minnesota Municipalities.

The League of Minnesota Municipalities closed its fifth and best annual convention, at St. Cloud, with a wonderful patriotic address by Mayor W. D. L. Hardie of Lethbridge, Canada. Mayor Hardie's subject was, "Which Shall it Be—'Kultur' or Civilization"? Mayor Hardie carried his audience with him by his recital of war conditions as brought home to his people through three years of conflict, and urged the municipalities of Minnesota to prepare for the things they must do as the war comes home to this country.

Wednesday evening President M. L. Burton had spoken on "Changes Ahead." He emphasized that the significance of America is not so much what it now is as what it is going to be, and when he bespoke the unqualified loyalty of every citizen the applause testified that he was expressing the sentiment of this entire audience.

State Auditor Perus spoke on the justice of the war and contrasted the German autocracy to the democracy of America.

A. D. Wilson, Federal Food Administrator, explained the work of the food administration and the effect of his presentation was a resolution by the League pledging cooperation and backing of the League for food conservation. Other resolutions voiced the patriotism of the League, as emphatically as did the applause the delegates gave every patriotic expression.

The League voted to invest $200 of its funds in Liberty Bonds of the Second Liberty Loan, and as much in subsequent issues as the condition of the treasury would permit.

It was voted to send the executive secretary of the League, Mr. E. L. Bennett of the Municipal Reference Bureau of the University of Minnesota, to attend the convention of the National Municipal League in Detroit, Michigan, in November. The following were elected to office—Mayor Michael Boylan, Virginia, President; Vice President, George G. Magnuson, Commissioner of Finance and Accounts, St. Cloud; Secretary-treasurer, Richard R. Price, Director of University Extension, University of Minnesota; Executive Secretary, E. L. Bennett, Secretary of the Municipal Reference Bureau of the University of Minnesota; and Trustees, J. A. Farrell, Alderman, Duluth; Charles P. Hall, City Attorney, Red Wing, and J. N. Nicholsen, City Attorney, Austin.

Utah Municipal League.

The annual convention of the Utah Municipal League was held at Ogden, October 9-11. The first session was held in the city hall Tuesday morning. Mayor Abbott R. Heywood opened the meeting, after which was the address of welcome by O. J. Stilwell. Following Mayor Heywood's speech, Mayor W. Mont Ferry, of Salt Lake spoke. He spoke concerning the need of closer co-operation among the cities in the state, as follows:

We must develop a greater spirit of unity and co-operation among the cities of Utah. This Municipal League has been formed for such a purpose, and it behooves us as city officials of different cities of the state to see that that object is furthered by this league. The more we co-operate the more benefit will we receive individually and collectively, and the greater honor will we thus bring to our state.

The strength of this league is not felt completely enough among the state legislators, so that when legislation has been prescribed, which we, as municipal officials, could see was desirable and necessary, it has not been acted upon favorably. We represent the pulse of the real people more definitely than do the legislators. We daily come into contact with our supporters and know the needs of the community from first hand knowledge. Legislators are elected on a partisan ticket, while the personal element has more to do with our elections because we serve the people every day and serve them directly. We, therefore, are those who represent what the people want in the way of municipal legislation, and we, therefore, I believe should have a greater share in legislating for the cities of the state.

At the banquet in the evening, J. W. McHenry, mayor of Murray, opened the speaking at the banquet with an address on "Water Systems." He dealt with the supplying cities with water and many interesting sidelights were brought out.

"Finances of the Municipality" was the subject of an address by Leroy Dixon, city councilman of Provo.

Frank L. Hines, former superintendent of waterworks of Salt Lake City, was introduced and gave a demonstration of the pitometer.

The second day of the convention began with addresses by W. H. Folland, city attorney of Salt Lake, and by Dr. T. B. Beatty, secretary of the State Board of Health.

At noon a luncheon was given at the Weber club with the club as host to the delegates attending the convention. Following the luncheon, the delegates separated to meet again at 2 o'clock at Butler Way. At this meeting addresses were given by D. O. McKay on "Civic Improvements," and by William F. Long on "Building Roads and Streets."

An automobile trip through Ogden City was scheduled for 3:30 p. m. and the places visited included the Ogden Packing & Provision Company, the John Scowcroft & Sons' Company, the Utah Cereal Food Company, and the Utah Canning Company.

Attorney Folland, of Salt Lake, spoke on "City Charters and Their Value." The cities do not have sufficient legislative or governmental power, he said. The municipal officials have to supplicate the legislature, whose members for the most part do not know enough about municipal affairs to legislate intelligently for them, he said, and as a result necessary laws are not passed and the city exists in conditions similar to the provinces in mediaeval times. He called attention to the need for charters for cities to give them power of government considered essential to proper management of the city's affairs.

(*Continued on page 437.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERS are being constructed by Maumee, O., plans having been prepared by Geo. Champe.

A SEWAGE DISPOSAL PLANT to cost about $182,000 is to be built by Waco, Tex. Plans were prepared by the engineer, P. Trevino.

Logan, O., is to improve its WATERWORKS. Preparations of plans by the consulting engineers, Burgess & Long, has been begun.

Arma, Kans., is soon to vote on a WATERWORKS SYSTEM. The city has retained as consulting engineer A. C. Moore.

A five-million gallon RESERVOIR to cost $275,000 is to be built by Waco, Tex. The engineer retained by the city to plan the improvement is N. Werinskiold.

A SEWAGE TREATMENT PLANT and SEWERS are to be constructed by Waseca, Minn. Plans are in course of preparation by the consulting engineer, L. P. Wolff.

DRAINAGE DITCHES are to be constructed by Armour, S. D., following the plans and specifications drawn up by the engineers, the Dakota Engineering Co.

Sand Springs, Okla., is to have an election on the question of issuing $40,000 bonds for extensions to the SEWER SYSTEM. The consulting engineers for the city are the Benham Engineering Company.

Brigham City, Utah, is extending its WATER WORKS DISTRIBUTION SYSTEM and improving its RESERVOIR. The firm of Brown & Kleinschmidt is acting in a consulting engineering capacity.

Sandwich, Ont., is to construct CONCRETE PAVEMENTS. The engineer for the improvement is J. J. Newman.

WATERWORKS extensions are to be made by Tomahawk, Wis. The engineer for the improvements is R. W. Richardson.

Richmond, Va., is to construct a VIADUCT. The engineers for the structure are the firm of Carneal & Johnson.

Eagle Lake, Tex., is to construct a SANITARY SEWER SYSTEM. The work was planned by the Norris Engineering Company.

Improvements are to be made to the WATERWORKS and SEWERAGE SYSTEMS by Ogden, Kans. G. P. Taylor is preparing plans for the work.

A SEWER SYSTEM and DISPOSAL PLANT are to be built by Seguin, Tex. Bartlett & Raney have completed work on the plans for the improvements.

A SEWERAGE DISPOSAL PLANT, to cost about $75,000, is to be voted upon by Pittsburg, Kans. The engineers for the improvement are the firm of Black & Veatch.

In constructing a number of BRIDGES the Wakefield Drainage District, Wakefield, Neb., has the consulting services of the Towle Engineering Company.

Extensive improvements are to be made by Miami, Okla., including some to the ELECTRIC LIGHT PLANT and WATERWORKS and SEWERS. Bonds have been voted for the work and the Hughes Engineering Co. is drawing the plans.

PERSONALS

Rinfret, Raoul, has been appointed city engineer of Shawinigan Falls, Quebec.

Schreiber, F. W. has been appointed assistant highway engineer of the South Dakota highway commission. For the past seven years Mr. Schreiber has been city engineer of Watertown, S. D.

Shuey, Arthur F., has been appointed superintendent of the Tampa, Fla., Waterworks Co. Mr. Shuey was formerly assistant engineer of the Florida State Board of Health.

Shertzer, Tyrrell B., formerly city manager of Portsmouth, Va., is now associated with the Hydrated Lime Bureau of Pittsburgh as eastern district engineer with headquarters in New York City.

Clark, D. D., chief engineer of the Bureau of Waterworks of Portland, Ore., has been forced to resign by ill health.

McCulloh, Ernest, previously connected with the city engineer's office of Los Angeles, and with the United States Reclamation Service, has joined the Charles L. Pillsbury Co., engineers, of Minneapolis and St. Paul, and will supervise the department of civil engineering of the organization.

Pincus, Sol, assistant sanitary engineer in the United States Public Health Service, has been assigned to duty in the extra cantonment zone of Camp McClellan.

Hamlin, Homer, who was formerly city engineer of Los Angeles, Cal., has opened an office for practice as consulting engineer and geologist in the Central building of that city. Surface and underground drainage, water supply, sewerage, sewage disposal, irrigation and allied engineering and municipal problems will be his specialties.

Older, Clifford, bridge engineer in the highway division of the State Department of Public Works and Buildings of Illinois, has been appointed acting chief highway engineer until a successor is appointed to the position of the late William W. Marr.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

PORT HURON ROAD ROLLER.

A "Three-Use" Machine of Sturdy Construction.

The Port Huron general purpose road roller is designed for three types of service: it is a complete road roller; has capacity and power necessary for continuous hauling, and for furnishing belt power. As a contractor's equipment for road-building it is highly efficient, labor-saving and time-saving, as idleness of the machine is considerably reduced. It has a boiler conforming in design, construction and inspection to A. S. M. E. regulations and carrying a pressure of 175 pounds, and with an actual strength five times as great. The engine has compound cyclinders and a single-faced flat slide valve balanced in pressures—both of which are vital factors in economizing on steam consumption for a given amount of work done. The balanced valve also prolongs the life of the engine and cuts down maintenance costs. The roller has a number of other features designed for time and labor economy.

The front roll is made up of two wheels or rolls 46½ inches in diameter with a 29 inch face, making the total tread 58 inches. The unusually large diameter of these front rolls is of great advantage in rolling loose earth or crushed stone, small rollers frequently shoving the loose material ahead of them, forming low spots and ridges which necessitate extra work and expense in releveling. The rims of both front and rear rolls are beveled ¼ inch across the face, which allows the crowning of the roads instead of flattening. Both front and rear rolls are provided with bushings which can be replaced when the bore of the hub becomes worn.

The frame is made of 6-inch steel, channels firmly riveted together and reinforced by truss rods. The yoke is pivotally connected to trunnions at the front and rear of frame, which allow a wide range of movement of the rolls in running over irregular surfaces. A vertical shaft 3¼ inches in diameter is cast solidly in the yoke and extends through the smoke box, having bearings at the top and bottom in which it is free to pivot. Without backing the roller can be turned around in a space of 25 feet wide—and with backing, in a space 15 feet wide. Rear rolls or drives are each provided with two spring-mounted steel scrapers, one in front and one at rear. The four scrapers are operated by hand lever at the engineer's platform by which they can be simultaneously applied or thrown back out of the way to permit the use of picks or lugs in wheel rims. Front rolls have adjustable angle iron scrapers at both front and rear.

The boiler is designed and built for high pressure operation. Riveting is done in such a way as to insure perfect alignment. Stay-rods run lengthwise through the steam space from the back head to front tube sheet. All holes for entering pipes are reinforced. The steel used is highest grade open hearth homogeneous steel—and the boilers have a factor of safety of five. The longitudinal shell seam of the boiler is of the butt and double strap type. The smoke box is of the extended type; heavier live cinders and fire brands lodge and die out in the bottom of the extension. The water bottom fire-box has a number of advantages: mud is not baked fast to the sheets so that it can be cleaned out easily; less air leakage; more complete control of draft during the entire lifetime of the boiler. The boiler jacket is full length, and is complete and neat.

The Port Huron compound engine is a tandem compound, the cylinders being placed one ahead of the other and both pistons being fastened to the same rod. A combination valve, made of a single casting, distributes steam to both cylinders. This valve is designed to overcome the excessive pressure crowding it against the seat and the bad effects resulting therefrom. This slide valve, while made of a single casting, is really a combination high and low pressure valve. This one-piece construction of the two valves makes for balance and if one gets out of proper adjustment, the other is out the same amount, and when the low-pressure valve is reset, the high pressure valve has been readjusted. The valve follows up its own wear as the natural wear does no harm.

Another important feature of the roller is the friction foot brake with which it is equipped. This brake holds the engine in the belt without blocking the wheels, and therefore acts as a safeguard against accidents. A speed change, a special patented device, is still another valuable feature. It does away with the frequent necessity of climbing up to the governor, and the engineer can change the speed without leaving his place at the levers.

The brake horsepower rating is 50, the nominal 16. The over-all width is 8 feet, 6 inches; the height 10 feet, 6 inches, and the length 18 feet, 8 inches.

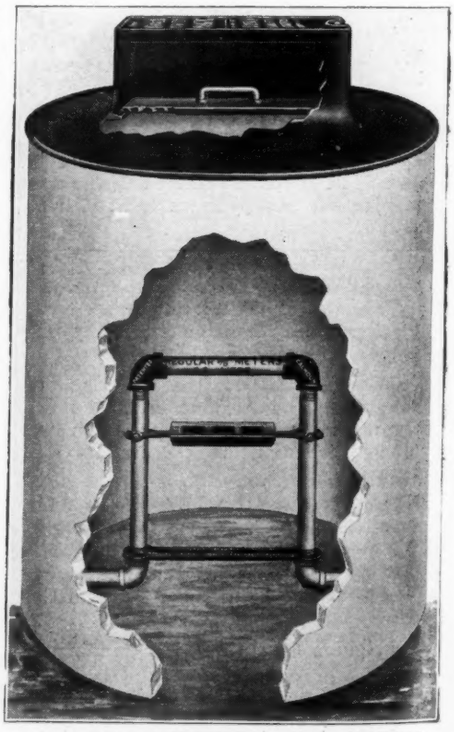
The accompanying illustrations show a side view of the roller and also a front view. The latter cut shows the construction of the front roll, the manner of mounting and the neat flexibility. This road roller is one product of a line of road machinery built by the Port Huron Engine and Thresher Company, Port Huron, Mich.

METER CONNECTIONS.

"Yoke" and "Turnbuckle" Unions With a Number of Improvements.

The modern "Calhoun" yoke and turnbuckle connections for meters are claimed o have a number of decided advantages over the ordinary straight or bent meter union. They are more simple to install and operate, and no wrenches or other tools are required in changing meters. Rigid installations are assured and leaks, stripped threads and broken risers are eliminated. The riser pipes stay where first placed and do not spring together or creep apart. The patent "stay" furnished with either type keeps the risers always the same distance apart and exactly right. Placing a meter takes only about a second—just as long as is required to reach down and give the hand wheel or turnbuckle a turn. There are no loose parts, everything staying in place, and nothing can be misplaced, lost or stolen. The operator does not have to lie down in mud or slush to force risers apart.

The adjusting screws are of bronze and cannot rust, stick, bind or cause similar trouble. The "yoke" adjusting screw pushes inward or pulls outward



MODERN "CALHOUN TURNBUCKLE" METER CONNECTON.

the elbow into which it fits. The "turnbuckle" either pulls together or forces apart the elbows, thus making or breaking joint. The elbows have over one-inch water ways up to the point of contact with the meter. In neither type are there any parts which can get out of order or require repair, so that maintenance charges are eliminated. Both types have provision for securely sealing the meter so that it cannot be removed without detection.

Both connections can be had in sizes to fit any ⅝, ⅝-¾, ¾ or 1 inch meter. The connections are furnished complete with gaskets, ready for use. The "stay" is placed over the risers, the yoke or turnbuckle is put on, the ells screwed on and the connection is ready for the meter. The yoke is just as adaptable to basement installations as to those made in meter housings. All connections will take any meter of same size and fit perfectly.

The accompanying illustration shows the modern "Calhoun turnbuckls" connection installed in a "modern" meter housing, described recently in these pages. These connections are one of the line of water works products made by the Modern Iron Works, Quincy, Ill.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop on all sizes, recently announced. Business, however, is dull. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra, all sizes.

The Roberts' Filter Manufacturing Co., Darby, Pa., has received a contract to build an eight million gallon gravity filter plant for the Newport News (Va.) Water, Light and Power Co. The Roberts company has just completed a three million gallon plant for Camp Meade, Admiral, Md., and is now engaged on the construction of a water plant for the Government's new shipyard at Hog Island, on the Delaware river.

Field for Tractors in Norway.—According to U. S. vice counsel Ralph A. Bernstein, Christiania, Norway, tractors are employed to some extent for road construction, and in a lesser degree for agricultural purposes. Practically none of those now operating in Norway, whether for road work or farming, are in excess of 20 horsepower. There is probably a field for more light tractors of 10 to 20 horsepower, and it is likely that they could be introduced most readily through an agency in this country familiar with all the requirements. Heavier tractors would not be practical in Norway. An American company has supplied many of the light tractors now operating in the farming sections of Norway, and these seem to be meeting with considerable success.. Road construction is conducted by the municipal governments, each town or city being responsible for the condition of the roads in a given area surrounding it. The larger cities own their tractors for operation on the highways. One of the reasons for the use in Norway of light tractors of 10 to 20 horsepower instead of heavier types is the fact that the roads in the farming district over which they must be driven often are too narrow and poorly constructed to permit of the passage of extremely large and heavy vehicles, such as tractors of 40 to 60 horsepower, of the types used throughout many parts of the western United States. Another difficulty which would confront the prospective introducer of heavier styles of tractors than those now employed would be the light construction of highway bridges spanning the rivers and mountain streams in the agricultural regions. The city of Christiania owns four tractors for street and road work of 15 horsepower each. They were constructed by the British firm of Aveline & Porter, Rochester, England, and were sold to the local city government through a Christiania agency. Tractors of this type have long been employed for highway construction here. The opportunities for disposing of new tractors to Norwegian municipal governments depend, naturally, on the completeness and efficiency of the equipment now owned by them. A list of Christiania dealers in agricultural implements may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., its district or co-operative offices. (Correspondents should refer to file No. 92562.)

NEWS OF THE SOCIETIES

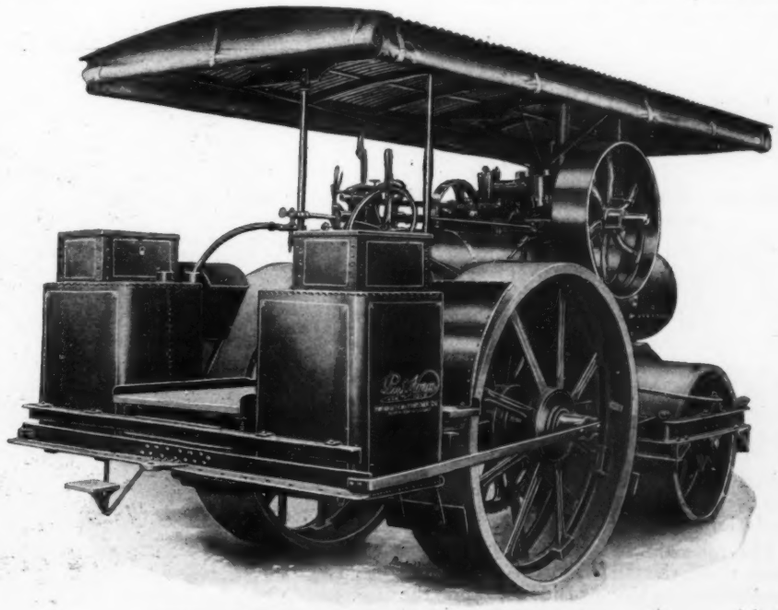
(*Continued from page 435.*)

He advocated also the consolidation plan for cities and counties such as the City and County of Denver and the City and County of San Francisco. This method facilitates government and greatly reduces taxes and expenses which have to be borne by the citizens. Especially in the case of Salt Lake City and Salt Lake County and Ogden City and Weber County, would this be valuable, he said, for the greater population of the districts is in the cities.

"We hear a great deal about the high cost of living these days," said Dr. T. B. Beatty in his address, "but we do not hear much about the high cost of dying. Do you know that the undertakers of the state are unnecessary, that these positions should be held by the governments of the various cities and towns, that this office should be a public office just the same as city physician and sanitary inspector Why should it cost a man several hundred dollars to be placed away in the ground? It costs so much to die that the average poor family suffers more contemplating the expense of the funeral than from the bereavement. And the undertakers take advantage of the grief and opportune moment to sell their goods when their patrons do not feel like protesting or arguing. This is only one of the improvements which we shall come to in the course of time."

Directors of the Poor and Charities and Corrections of Pennsylvania.

The 43d convention of the Association of Directors of the Poor and Charities and Corrections was held at Johnstown, Pa., Oct. 16-17. Officers for the ensuing year were elected and But-



SIDE AND REAR VIEW OF PORT HURON GENERAL PURPOSE ROAD ROLLER.

ler chosen as the place for the 1918 convention.

The election of officers resulted as follows:

President, Albert P. Roderus, Pittsburgh; First Vice President, W. W. Hawkins, Washington County; Second Vice President, Samuel E. Gill, Allegheny County; Third Vice President, Clark W. Baldwin, Delaware County; Fourth Vice President, S. A. Cramer, Warren County; Fifth Vice President, Fred Arensfield, Schuylkill County; Sixth Vice President, W. J. Trembath, Luzerne County; Seventh Vice President, Mrs. I. Roberts Comfort, Chester County; Secretary, Edwin D. Solensberger, Philadelphia; Treasurer, W. G. Theurer, Pittsburg; Assistant Secretaries—Miss Belle Chalfant, Pittsburg; James L. Reilly, Wilkes-Barre; Honorary Secretaries—L. C. Colburn, Somerset; Fred Fuller, Scranton.

The morning's session was marked by an address by W. H. Kuhns, Superintendent of the Lehigh County Home, Wescosville, who spoke on "County Home Management," O. M. Watts, Superintendent of the Butler County Home at Butler, discussed "A Truck Garden as an Asset to the County Home." "The Value of a Dairy in the County Home" was the subject of an interesting paper by Grant Boger, Superintendent of the Lebanon County Home.

"Conserving Food in the County Home" was the subject of a paper by Albert P. Roderus, Director of the Allegheny County Home, and Mrs. M. A. Bradt, Matron of the Rouse Hospital, Youngsville, Warren County, Pa.

"The Value of a Trained Nurse in County Homes" was the subject of a paper by George M. Strickler, Director of the Fayette County Home, Uniontown.

Another discussion was on "What Power Should Be Vested in Superintendents and Matrons of County Homes Should Important Questions Arise during Absence of Members of the Board?" James L. Reilly, Ashley, and George B. Jeffries, Uniontown, lead the discussions.

Highway Traffic Association of the State of New York.

The annual meeting of the Citizens' Street Traffic Committee of Greater New York was held at The Automobile Club of America, Wednesday, October 10th.

In accordance with the recommendation of the Executive Committee, at their meeting on September 26th, it was unanimously voted, that the name of "The Citizens' Street Traffic Committee of Greater New York" be changed to "The Highway Traffic Association of the State of New York."

The following changes in titles were made: Chairman to president; vice-chairman to vice-president; and the additional office of honorary president was created.

The nominating committee submitted the names of candidates who were elected as follows: Honorary president, William P. Eno; president, Prof. A. H. Blanchard; vice-president, David Beecroft; secretary, Elmer Thompson; treasurer, George H. Pride.

Indiana Conference of Charities and Corrections.

At the annual meeting of the conference, held at La Porte, Ind., Oct. 1-3, Evansville was selected as the 1918 convention city. Officers were elected as follows: Judge James A. Collins, president; F. J. Pitner, La Porte; T. F. Rose, Muncie; Miss Margaret Elliot, Indianapolis; and Donald Du Shane, Clinton, vice-presidents; Frank D. Loomis, secretary.

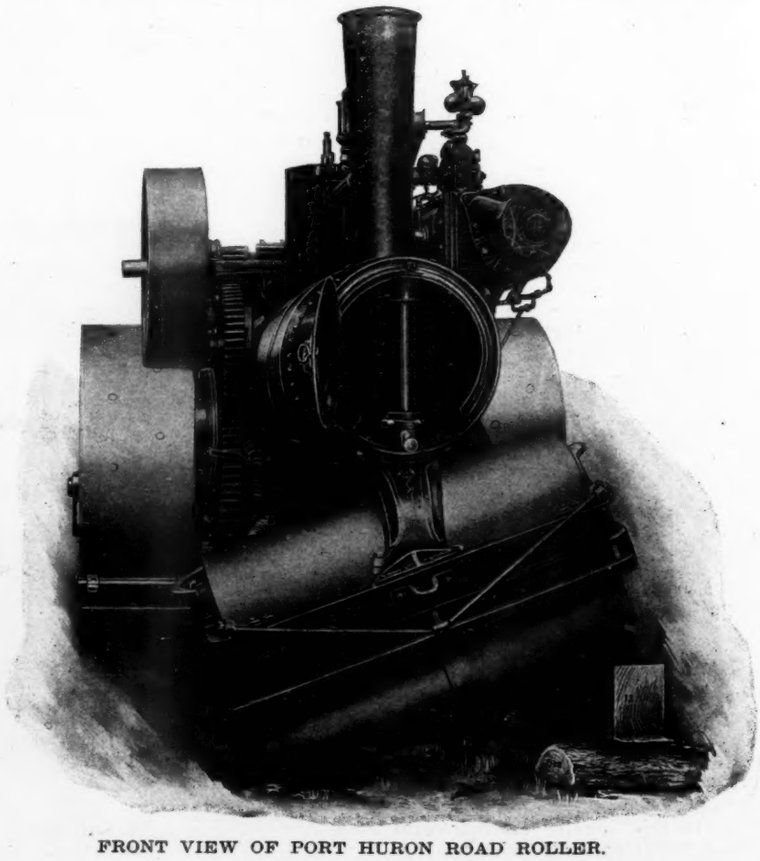
BOOK REVIEWS

WATER SUPPLY ENGINEERING.—The Designing and Constructing of Water Supply Systems. By A. Prescott Folwell. Third edition; rewritten. 484 pages; 121 illustrations. John Wiley & Sons, New York. Price, $3.50 net.

This new edition of a book that first appeared eighteen years ago differs quite materially from the first two editions, as explained in the preface, quoted below. A number of engineering schools have used it as a text book ever since its first appearance, and the suggestion of the professors so using it have been profited by in this revision. Because of the fact that the author is also the editor of Municipal Journal, no review of the book will be given further than a quotation of the preface, which is as follows:

"During the eighteen years since the first edition of this book was written there have been great advancements in waterworks theory and practice, especially in those branches having to do with the quality of water. Consequently, not merely a revising, but an entire rewriting, of the book seemed to be necessary if it was to continue to be of any service to waterworks students and practitioners.

"In the present edition the matter treating of water purification and the quality of water has been entirely rewritten at much greater length. That describing pumping machinery also is practically new throughout, and hardly a paragraph of the original text has been used without some change calculated to bring the subject up to date. This resulted in considerably increasing the length of a work that was already too long from some points of view, and Part II of the first two editions, dealing with construction, has been condensed to a single chapter, and Part III, dealing with maintenance, has been omitted altogether. Also the chapter on hydraulics has been omitted, since those using the book are assumed to be familiar with and to possess a text book discussing the principles of this subject. Several of the chapters have been rearranged so as to present the subject matter in a somewhat more logical order."



FRONT VIEW OF PORT HURON ROAD ROLLER.